BEFORE THE

CALIFORNIA ENERGY RESOURCES CONSERVATION

AND DEVELOPMENT COMMISSION

WORKSHOP

2008 CALIFORNIA BUILDING ENERGY

EFFICIENCY STANDARDS

CALIFORNIA ENERGY COMMISSION

HEARING ROOM A

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SACRAMENTO, CALIFORNIA

THURSDAY, MAY 18, 2006

10:10 A.M.

Reported By:

Christopher Loverro

Contract No. 150-04-002

STAFF PRESENT

Mazi Shirakh

Ram Verma

Gary Flamm

Bill Pennington

Bruce Maeda

ALSO PRESENT

Nancy Clanton, Clanton and Associates

Bernie Bauer, Integrated Lighting Concepts

Steven L. Blanc, PG&E

James Benya, Benya Lighting Design

Charlie Yu, Architectural Energy Corp.

Stephen C. Prey, CalTrans

Richard N. Miller, RNM Engineering, Inc.

Jon McHugh, Heschong Mahone Group, Inc.

Jon Null, WattStopper

Andre Desjarlais, Oakridge National Lab

James Benya, Benya Lighting Design

Leslie Davis, Auerbach-Glasow

W. Lee Shoemaker, MBMA

Philip D. Dregger, Pacific Building Consultants

John Goveia, Pacific Building Consultants

John Hogan, City of Seattle

Dave Ware, Owens Corning

Charles Knuffke, WattStopper

I N D E X

P R O C E E D I N G S

MR. SHIRAKH: Okay. Good morning, everyone. My name is Mazi Shirakh, and we're going to start the workshop today.

This is continuing in a series of staff workshops that we're holding for the 2008 standards. Previously we've had workshops in October, February, March, and so, you know, we have a two-day workshop scheduled for today and tomorrow. Today's topics are going to be mostly non-residential, and tomorrow's are going to be a mix of residential and non-residential.

We will have another set of workshops probably coming up in July, and that would be the last staff workshop for the 2008 standards, and then we'll move to the next phase of the project, which would be writing the draft standards and, and the move into the adoptions hearings.

There is a copy of the agenda outside. If you don't have it, you know, you're welcome to go and grab one. This morning's topics include the Outdoor Lighting, Indoor Lighting, and then after the lunch break we're going to be talking about Non-residential Insulation, and then from 2:30 until 4:30 we have a Public Comment period

where anybody is welcome to come up to the podium and discuss your comments related to the topics presented, or other topics.

We have a number of people on the phone. The way the workshop is going to work is the presenters are going to be presenting their, their slide show. During their presentation we ask that if you have a clarifying comment to the topic that they're presenting, you can ask that. Otherwise, all the discussion and questions and comments would be left, saved for the end of their presentation. And that way the presenters can get through their, their presentation more efficiently.

When you come up to the podium, you need to state your name and your affiliation every time so the court reporter here can, can log that. It would be helpful if you can hand him a business card.

As I mentioned, this, this is being Webcast and there's a number of people on the phone. I'm not going to go through and ask everyone in the audience to identify yourself, but I would like to know who is listening on the phone, if you can introduce yourselves.

Is there anybody on the phone? Well, I guess not.

So with that, the first topic of the day is -- before that, I need to introduce some key person out here. To my right is Bill Pennington. He's the Office Manager for the Building and Appliance Standards. My colleague, Ram Verma, he's the technical lead for the 2008 Standards. Gary Flamm is, is the lighting lead. And we also have Bruce Maeda, who will join us later.

We are working with a committee of two Commissioners, Commissioners Pfannenstiel and Art Rosenfeld, who will probably be represented today by their advisors.

Charles Gill is our prime contractor, but he is, has another obligation in Hearing Room B, so he may be going in and out today.

So with that, I'm going to turn it over to the PG&E team, Steve Blanc. As you know, the, our utilities, PG&E, Edison and Sempra, they are our partners in, in the standard-making proceeding and they have made a substantial effort to make the standards better and more efficient, and the work, the implementation. And actually, the two topics that are being presented today, they are

both funded by, by PG&E. Steve.

MR. BLANC: Good morning, everyone. I'm Steve Blanc with PG&E"s Customer Energy Efficiency Program. We wanted to present to you our non-residential case proposals today. Nancy Clanton -- oh, God, I'm losing my mind -- Bernie Bauer and Charlie Yu were going to present for our three contractors, but I'm here to kind of set the stage.

Next slide.

Just to kind of do a little review and why we're in this. Consumption, energy consumption in California is basically driven by population growth. All the utilities are under a great deal of pressure in terms of providing power and gas to now over 40 million, or almost 40 million people in, in the state of California.

Next.

We have serious constraints on adding generation and transmission capacity. We have, through regulatory fiat and our own economic analyses, shown that energy efficiency is less expensive than adding capacity, so we have made a big investment in energy efficiency across the board. And, of course, state policy is now that

we provide efficiency and maintain efficiency before adding anymore electrical capacity. And as you can see the goals it set up there, and the, the real point of this slide is the fact that this, starting now and going forward, the IOUs get credit toward their energy goals for doing their codes work.

We provide the Commission staff as our proposals what we call Codes and Standards Enhancement Studies. These provide both technical and feasibility information on the energy savings for each one of the code regulation updates or additions or revisions that we are talking about doing.

The three we're presenting today, as you can see, are part of a large number that PG&E will be presenting. I also really want to point out this point at the, the bottom you'll see Southern California Gas, SDG&E, our Sempra partners, are our partners on the outdoor lighting and indoor lighting, both of the ones that are presented this morning. Envelope, envelope insulation presented this afternoon is a PG&E one.

And I'd like to bring up Nancy Clanton, from Clanton Engineering, and she is going to

present the outdoor lighting proposal.

MS. CLANTON: Good morning, everybody. Next slide.

The overview of the proposals basically are limited, or not limited, but focusing on reducing some of the lighting power densities in Tables 147-A, which is specifically power allowances for general site illumination, and also reducing them, the lighting power densities in Table 147-B, which are specific to specific applications.

There's a new proposal that we are proposing to actually add initial wattage allowances, and we're referring to them as IWAs. And those are for applications where we have very small or awkward geometry areas. Instead of increasing all the LPDs up, we're looking at giving initial wattage allowances.

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Here are a few other things that we are proposing, is to remove the security multipliers when the lighting power densities actually meet IESNA G-1. And for those of you not familiar with that, that is a guideline on security lighting. We also would like to clarify that security

multipliers should apply to retail parking lots and not outdoor retail, which was kind of a confusion in the 2005. And then the other thing that we're doing is that we're adding security lighting multipliers to for only Lighting Zone 3 for parking lots and hardscape areas with special security requirements. And we'll go over these in detail.

Next slide.

Here's a few other issues. We are moving the Outdoor Sales LPD from Table 147-A to 147-B. It was in the general site illumination, and we've decided to move it to specific areas applications, mostly so that we won't have a, a doubling or we want to use it or lose it type of application.

The other issue is we are adding a dimming or night-time lighting reduction requirement for lighting that's operating all day and night. An example of this would be garage entrances, where you would need higher lighting levels to accommodate for the, the daylight, when you go into a garage, but we want to make sure that that lighting is turned off at night. In fact, there are some safety reasons why you would

definitely want that lighting turned off at night.

Here's kind of a major change. We are changing the cutoff requirement from 175 Watt, greater than 175 Watt down to 150 Watt. And this kind of goes along with some of the, the new compliances in 2008 for the appliance standard.

We're also updating the LPDs in Table 147-C. These are specifically lighting LPDs when a local jurisdiction has local ordinance we want to adjust these according to what we're recommending in 147-A and B.

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So here's what the recommendations are based on. The most important one is probably we are looking at appropriate IESNA recommended practices, design guidelines, or general documents applicable to that application and lighting zone.

Second thing is that we're revising the lamp efficacy per 2008 Title 20 requirements. We have also done a variety of lighting models, very typical to what's recommended in RP20 as far as parking lots. And so we're varying the pole heights, the spacing, typical situations, and using a variety of lighting models to convert criteria into LPDs.

Next slide.

We've also used very standard typically available luminaires. We're not using high performance luminaires. We're basically modeling everything with commodity luminaires. And again, we're assuring that the design scenarios do meet the IESNA recommended practices. Many times what the, the recommended practices, we may have a design criteria that is, is ruling one more than another, where it may be the average illuminance, it could be the minimum illuminance, or it could be the uniformity, the max demand. Whatever the ruling factor is, then we've adjusted the LPDs to make sure that we can meet all that.

And then we're comparing the LPDs from Table 147-A and B with the LPDs for these appropriate scenarios. And that's how we have developed our recommendations to many times lower the LPDs from 2005.

Next slide.

In the calculations we've looked at typical grid or linear arrangement of luminaires applicable for the calculations. And again, this is in accordance to the recommended practices of IES. If there were reflectances included in the

calculation specifically for the canopies, gas station canopies, then we've used moderate levels. We haven't done a high reflectance or a very low, and we've also varied height, mounting height,lamp wattage, luminaire spacing, everything, to try and meet the IESNA criteria.

And we've also used high efficacy lamp sources similar to pulse start metal halide or fluorescent.

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This is exactly what the methodology from 2005. We have not changed this methodology at all, and the calculations.

Next slide.

We're also using metal halide lamps that are 60 lumens per watt or greater for outdoor retail and canopies. We're using compact fluorescent lamps specifically for the entries and facades. WE are using mean lamp lumens per manufacturer's lamp information, and we're using a luminaire dirt depreciation factor of .7.

Next slide.

When we're comparing the different LPDs, we're looking at the recommendations and all of the modeling we've done to make sure that every

single LPD we are recommending will follow an appropriate IESNA recommendation required to meet the minimum light levels and uniformity, and we're comparing them to the proposed lighting power densities. Then we've looked at the 2005 LPDs and we've compared them to the selected IESNA guidelines.

We notice that the 2005 LPDs showed a substantially higher allowance than necessary to meet the IESNA recommended levels. If this were true, then we adjusted the LPDs. And in the Appendix C of the CASE report, shows -- I think there's probably up to 47 pages of it -- different calculations and spreadsheets to show all of our calculation data.

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Now, this is explained initial wattage allowance. Basically, like I mentioned earlier, this is going to account for unusual or difficult geometries or application aspect ratios. By putting in an IWA, this should allow for those unusual situations versus increasing the LPDs across the board. An example would be for an entrance canopy we've made sure that you could at least put one 18 Watt compact fluorescent lamp,

even if it's a very small canopy, in LZ1. And an example would be a 320 Watt metal halide for a parking lot in LZ4. And all the different IWAs are listed in the case report.

We're proposing that for many of the applications, such as parking lots, you only apply an IWA once per site, instead of per application. But for entrance canopies, we are proposing that the IWA is added once per entry. And in some, some applications, we do not have IWAs.

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In the Life Cycle Cost Analysis, we haven't changed the amount of equipment or the type of equipment compared to the 2005. And so the life cycle cost analysis basically is an immediate payback for our proposals because we've many times used less equipment and we've also, the power densities are lower.

Next slide.

Here's an example of the appropriate IESNA guidelines that we've picked for Table 147-A. And in the case report we'll show all of the different applications that we've looked at. If we -- we are not proposing a change in LPDs we did not list the appropriate IESNA guideline. We only

listed the ones where we are proposing a change.

And for this particular one, which is parking lots, you notice that in Lighting Zone 1 we are meeting RP-20-98, which is part of the table in RP-1, but there's no vertical illuminance requirement. In Lighting Zone 2, we're meeting the basic requirements in RP-20. Lighting Zone 3, enhanced requirement. And in Lighting Zone 4, it's enhanced security/retail requirement in RP-20. And please note that it also meets G-1-03 for parking lots, which is a three horizontal for candle average.

Next slide.

Here is just examples of how the 147-A tables are being changed. If you notice the, the values in red are the previous 2005, and the values in blue are the proposed changes in it. The values that are, are shown in black we are proposing not changing.

Next slide.

Here's an example of the initial lighting power allowances. This particular one is for hardscape for automotive vehicular use. Again, I'm using parking lots as the example. And it will show you how with the, the small lots or

the unusually shaped lots, that you will be allowed this once per site, these allowances.

Next slide.

Here is the 147-B lighting power allowances for specific applications. And in this particular table, you will note that outdoor sales lot has been moved from 147-A to 147-B, and that's why that's showing up as brand-new. And again, the, the values in red are the 2005, values in blue are the 2008 proposed.

Next slide.

And then this shows the IWAs for specific applications. Some of them, like we mentioned, do not have IWAs. We felt that it did not warrant putting an IWA in. It basically was for the, the specific uses where we felt that the LPDs may not be adequate for unusual situations.

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The, the security multipliers were in the original 2005 code, and the changes we're proposing is in retail parking lots to eliminate the security multiplier from Lighting Zone 1 and only have it applied for Lighting Zone 2 and 3. We also wanted to kind of change some confusing language in the security multiplier for parking

lots and walkways within 60 feet of entrances to the building law enforcement fire, ambulance, et cetera.

We're taking out to the building, because this was sometimes confused with if there were a space in front of any type of store, retail store, that the fire department or the law enforcement agencies needed, that people were applying this security multiplier, where it really should only be for the buildings of law enforcement, fire, ambulance, and emergency vehicles. And we've also limited it to Lighting Zones 1, 2 and 3, because we felt that Lighting Zone 4 already had adequate LPDs.

Now, will you please notice that we've added security multipliers for Lighting Zone 3 parking lots with special security requirements, and also hardscape areas with the same. And the reasoning for this is that the LPDs in 2005 were originally based around G-1 security lighting for LZ-3, and we have decided to use specific applications in IES for LZ-3, but then allow people with special security needs to be able to increase the lighting levels instead of just making a default. So that's a pretty major change in how we're looking at these particular LPDs.

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So, I'll leave this right now for some discussion, but here are some discussion topics that we're kind of anticipating. The smaller awkward site configurations if our, our initial wattage allowance is going to work. And also, during the stakeholders meeting last week we, there were some questions that we may not have done enough modeling for the smaller awkward sites. We are proposing to do more modeling to look at these configurations. And we would like some input on, on if you have some smaller awkward sites that you would like us to look at.

We would also like to have a discussion on whether our appropriate IESNA application selections are correct, and then our appropriate definition of areas deemed to have special security requirements. We would like to meet the intent of G-1, but the language definitely has to define clearly when security is an issue. And so we're again anticipating some discussion on that.

MR. SHIRAKH: Okay. Any questions or comments on Nancy's presentation related to outdoor lighting?

Could you state your name and affiliation, please.

MR. PREY: Yes. My name is Steve Prey, I'm with CalTrans. And I was just wondering if

there were roadway lighting standards being looked at in revised 2008.

MR. SHIRAKH: No, we're not. Basically, as Nancy's presentation showed, we are pretty much looking at what was in 2005 standards, and we're just updating the information contained within it. We're not proposing substantial addition to the scope, although if CalTrans is interested, you know, we are required to work, you know, with your agency related to any standards that pertains to highways and public roadways. So, and we will be happy to listen to any proposal that you may have.

MR. PREY: Okay. Then I'll be working with Gary to update a number of the projects we've been, we've been doing some studies on, as far as roadway lighting, intersection lighting, and street lighting applications, trying to find ways to drastically reduce the amount of energy being consumed or thrown down on the roadway surface itself. And we're into induction lighting, and also LED luminaires, which give us linear rather than point source, and we've also got UC Berkeley School of Optometry on contract doing some human factor study in these areas.

So a number of items are coming due within the next year or so, so I'm thinking you folks might be interested in seeing what we're

doing.

MR. SHIRAKH: We are interested, but, you know, we have to demonstrate cost effectiveness for all of these measures, so, you know, it is --

MR. PREY: That will be included.

MR. SHIRAKH: -- it is rather detailed, and we also --

MR. PREY; For example, we have already done a statewide retrofit of all our sign lighting to induction lighting, and it was all cost effective, so we're moving in those areas.

MR. SHIRAKH: Well, you know, you've been working with Gary, I'm sure, on some of these items, so I know we'll be happy to continue the dialogue.

MR. FLAMM: Wait a minute, Steve, before you leave. This is Gary Flamm with the Energy Commission.

Early in the 2005 rulemaking, there was a model public right-of-way standard put forth, and it was for voluntary purposes, and that was never fully developed. Where we ended was that public right-of-way lighting was not going to be regulated by Title 24.

MR. PREY: Okay.

MR. FLAMM: That document, in my mind,

was never really finished, and perhaps it might be a good starting point if you think that it would be appropriate to have some kind of standards for public right-of-way.

MR. PREY: I do, because the impact of this would be your entire night-time street lighting grid for both cities, counties, and state, and the impact of the products that we're developing and some of the strategies we're coming up with might show some substantial savings. We're looking at between 100 to 1,000 megawatts statewide reduction if all our products get put in. So that's just CalTrans. We're only about ten percent of the road, so.

MR. SHIRAKH: One other note is that time is of an essence here, as I mentioned. We have only one more public workshop scheduled for 2000, and so, again --

MR. PREY: Granted. So it may go into the, what is it, 2011 cycle.

MR. SHIRAKH: Right.

MR. FLAMM: So Steve, it sounds like CalTrans is kind of actively interested in the Energy Commission pursuing standards for roadway lighting. Is that, is that accurate?

MR. PREY: Either directly through Title 24, or some other parallel action, similar to what

we did with the light-emitting diode traffic signals, where we've come up with rules on that.

MR. FLAMM: Okay. So I agree with what Mazi said, that, you know, we're probably too late for this round of standards to do it, but if we were going to pursue that, seems like the two agencies should get together and try to create a work plan for trying to do that for 2011.

MR. PREY: We were planning on bringing you folks in on that. We just got the contracts on the human factor study for on and off ramps, and -- which will have secondary component on intersections, intersection lighting. So as soon as we start rolling with our team meetings, we'll bring Gary in on that.

MR. SHIRAKH: Yeah. I mean, we're, we're interested in this, whether it be 2000 or 2011, I think we should do it.

MR. PREY: Well, that's where half my electrical load is. It's out there on the roadways, so if I can knock it down by 90 percent, I think that's pretty good.

MR. FLAMM: Maybe we could make an argument that if we work together on standards that would be savings that might apply to the green building initiative goals. And, you know, I know that it's a building related issue, but --

MR. PREY: That's been my contention all along. It's, the GAP and the folks there are all focusing on buildings, whereas that's only about 20 percent of my total energy use when you look at my 18,000 fleet, and --

MR. FLAMM: Okay. So maybe we should poke at that some. That's very interesting.

MR. PREY: Okay.

MR. FLAMM: Thanks.

MR. SHIRAKH: Thank you, Steve. Any others? Sir.

MR. MILLER: Rick Miller, with RNM Engineering, electrical engineering and lighting consultant, San Francisco.

I would like to compliment the proposed addition of a initial wattage allowance. Appreciate it that it will address some of these awkward and small problems to solve. And also appreciate the recognition of adding the G-1, or that G-1 is there. I do recognize that the Commission will have a challenge in defining when special security requirements is an issue, because whenever I ask any of my clients if security is an issue I have not had one client who said security is not an issue.

So when does, when do we get these extra multipliers? From my clients' perspective, every

project would be getting them. And I don't believe that is the intent of the proposal. So you will have a challenge, and come up with a definition of special security.

MR. SHIRAKH: That's a very good point, it has been brought up. So we need to think about that.

MR. MILLER: Okay. Thank you.

MR. SHIRAKH: Do you have any response to that, Nancy?

MS. CLANTON: No. I totally agree with Rick that that is going to be a huge challenge, is defining when security is an issue.

MR. PENNINGTON: Nancy, I'm wondering if you could maybe give us an example situation for when an IWA is necessary and how you calculated that IWA for a specific situation?

MS. CLANTON: I'm doing this from memory right now, but if you have, for instance, a very small parking lot with I'm going to say eight to ten spaces, you just really cannot get the uniformity that IES is asking for in RP-20 with only one pole. And so we specifically have said in a lot of these small parking lots you probably need two poles, and that'll be an example. Also, a small entry canopy where the canopy is, you know, maybe four feet by six feet, and you can't

get the LPDs to even allow for an 18 Watt compact fluorescent.

So it's basically looking at those situations where we need to have at least some light or some uniformity, more than anything else.

MR. PENNINGTON: So for each one of these IWA categories where you've, you're making a proposal, is there some sort of scenario that you're trying to address for that particular item that could be demonstrated for the record?

MS. CLANTON: Right now what we've done is our best scenarios on it, and one thing we are proposing is to actually do some more calculations to gather some more awkward sites, small sites from the stakeholders, and to review those to make sure that our IWAs will work in those situations.

MR. PENNINGTON: Okay.

MR. FLAMM: This is Gary Flamm. I, I think it's my understanding that the IWA is to be available for all sites, rather than trying to define which sites it's available for. It's my memory that in the '05 rulemaking that we fudged the numbers upward to try to account for those possible small geometries. And so with the proposal that HMG, PG&E is making, they're lowering some of those numbers and then saying okay, you've got an initial power allowance. The

larger the site, the less of a ratio of the load that number becomes.

MR. PENNINGTON: Right.

MR. FLAMM: So I don't believe there's going to be any limitations on which sites that applies to. So is that correct?

MS. CLANTON: Oh, absolutely, Gary. Thank you for that clarification. The IWA won't be applied to every project, but for a very large parking lot it's going to be insignificant. It's only for the small awkward sites.

MR. PENNINGTON: Right. So it seems like you must've had in mind some threshold scenario that you were trying to look at and establishing that that number was the correct number instead of that number minus 35, or plus 35.

MS. CLANTON: Correct.

MR. PENNINGTON: Kind of thing.

MS. CLANTON: It was basically done with -- from good practice.

MR. PENNINGTON: Okay. So I guess what I'm hearing the answer is, is go look at the technical documentation, rather than your telling me what the scenarios are.

MS. CLANTON: Yes.

MR. PENNINGTON: Okay. That'll work for

now.

MR. SHIRAKH: Jim.

MR. BENYA: Jim Benya of Benya Lighting Design, Consultants to Architectural Energy Corporation and to the Commission.

Just wanted to add so that everybody knows, there was a very in depth workshop review of this last week, and I want to compliment the PG&E team on doing a really good job on this one in particular. It's very important that everybody realize that one of the ways that we are able to reduce the power density allowances from the 2005 standard to this proposal, particularly in -- look in Lighting Zone 3, is that in 2005 we assumed G-103 would be provided for all Lighting Zone 3 type projects.

And that is not the case here. The case here is that they're saying no, you won't, you're going to have to ask for it to get it. With the point that was made a minute or two ago about the fact that virtually every project seems to have a security concern, one of the important considerations in this proposal is whether or not deciding to make you add in an adder for security is, is a useful step or an unnecessary step, and a loophole type of issue.

All of these things were talked about

very thoroughly, though, and I would hope that at the next time we get together, that the things that Nancy's proposing to do are done so that we can refine these values a little bit more. Right now, though, in general, with this additional power allowance for small properties, I think most of the problems that -- and they're minor, that came out of the 2005 standard, most of the problems that, that we find in enforcement other than these, Gary and Mazi and I have been working on, I think we're in pretty good shape. So thank you very much for a good job.

MR. PENNINGTON: I have one, one other question. I'm not sure I understood the specific problem you're trying to address with moving the outdoor sales lots from the general table to the specific table. What, what's the problem?

MS. CLANTON: Well, in the specific, or in the general area, basically we didn't want to be able to take the lighting power densities and move it throughout the site. We want it specifically for the sales lot, and we just felt it was a better location to put it in a specific application, instead of in the general site.

MR. SHIRAKH: The general lighting applications, you can do trade-offs between various functions. And sales lot was listed in

there, and probably with not very good justification. The 147-B are use it or lose it type application, and it's, probably it's more appropriate it belongs there. So I think that was one of the rationales.

And to some of what Jim and Nancy were saying is related to hardscape areas. In 2005 we made sure that the G-1 security requirements were built into the base LPDs. What the PG&E team is proposing is to actually make the base LPDs based on the appropriate RPs, and then handling the security requirements through multipliers. And that's why you, sometimes you see a kind of a drastic change, but, you know, then the multipliers will take care of some of those differences. And I can live with either approach, and we're asking for the public to provide comment.

Any other question or comments related to outdoor lighting? Is there any NEMA representatives in the room? Or on the phone?

Okay. Then with that, we're going to move to the next topic, which is Indoor Lighting. I'm going to turn it back over to Steve Blanc, and he can introduce the next presenter.

MR. BLANC: I'm glad I can do something here. Again, I'm Steve Blanc. We'd like to

introduce Bernie Bauer, who is going to present our indoor lighting proposal. And this should be more interesting than the outdoor.

MR. BAUER: Morning, everybody. As Steve said, I'm Bernie Bauer. I almost feel like I'm at a meeting of Alcoholics Anonymous, because at one time before 2005 I was sitting on this other side of the fence and really challenging what we were going to do for 2005. Now I'm here talking about 2008 and presenting the PG&E case and creating even more challenges, and I, I welcome your rebuttal.

Next slide.

The overall proposal scope that we're dealing with is obviously to reduce the lighting power densities, the LPDs. We're targeting non-residential. We want to reduce the daily lighting power consumption but do not want to lose visual performance. We're focusing obviously on Tailored Method of Title 24 because that is the area, as we got into this, that we realize there's, there's a larger LPD reduction. As we actually looked into this, we're not touching area method at all, because in our studies we found out that pretty much the 2005 area methods are pushing us against the wall, and even with technology improvements we don't see a lot happening to be able to change

those numbers. So we're keeping those, but we think in some of this tailored method we have some opportunities.

And some of the area, we're going to look at some area category recommendations as well, but they're not, not as significant. We're not even going to present those in detail today. They are in our report being submitted.

Next slide, please.

Our focus and our highlights. Obviously, the accent and wall display, trying to reduce those LPDs. We are going to either eliminate the mounting height factors for retail -- actually, this is one that I would like to take under reconsideration because right now we are looking at it, but we're not 100 percent convinced that, that this is a good thing, especially when, if we take into a case our base lower level lighting, we have now in that particular item the ability actually to change our mounting heights a little bit different what we've presented, is that these mounting heights kick in at a lower ceiling height than what is now in '05.

We do want to redefine the wall versus floor lighting criteria. We don't feel that the six feet foot distance meets all, and actually it should be proportionate to the kinds of angles of

the lighting that's on the wall. So, in other words, in a nine or ten foot ceiling a number like four or five feet would be much more appropriate than six feet away from the wall. And at the same time, if you were in a real high space dealing with, let's say, 16 or 18 feet, six feet sometimes is often very close to the wall and maybe there a seven or even a nine foot distance would be better. And, and the details of what we're recommending, again, is in, in the proposal.

One of the other things that we've, we're considering is some trade-offs between the wall and floor display. We're still shaking out that model, how we can get that and not have people mis-use it. But in actual applications that I've been working with already in 2005, I found a few places where I'm under on my floor and I really need 10 or 15 percent more on that wall, and if I could borrow from that, that would certainly help that design.

And again, probably a real, another one is we realize as we scrunch these wall LPDs, there are going to be certain kinds of designs that by nature, and I use one as an example, anybody that's seen this, is the florist shop, where there's a very high degree of wall illumination, that if one justified -- and again, on your plants

and so forth, showed that in that particular instance you needed a little higher, higher wall density. We have a table in the proposal that would allow you to do that.

Now, probably one of the real big ones that we feel very strongly about is mandating expanded controls. And we've got some details we're going to go over in that further down.

We want to expand daylight harvesting requirements. We think there's more opportunities in some of the other retail spaces to pick up some benefits from daylighting. And the last part that is not in blue, the reduce ambiguity. Again, we're, we're looking at that as part of this whole thing with the general lighting and how the general lighting and perimeter and, and display lighting would, would work together as a total package in tailored method.

Next slide, please.

Obviously, the energy benefits are yearly savings. There's some non-benefits, too. Believe it or not, when we say well, we're reducing LPDs, and that might mean reducing light levels in some instances, it doesn't necessarily mean poor lighting design. One of the things, and the way we achieve most of this, is really by new technologies. And the side benefit of new

technologies, ladies and gentlemen, is that usually the lamps are better, they have better maintenance, better color, and the luminaires oftentimes designed with it are better luminaires, perform better than the typical low level luminaires that might be a starter.

Next.

We do realize there are some technology issues. Although the fixtures and lamps are now available, probably one of the biggest issues is cost. And, of course, first price and lamp replacement cost. And that's one of the things we're struggling with. The initial push of the proposal, for example, was to say that ceramic metal halide would be the panacea that would get rid of incandescent lamping. We feel that that is valid in higher ceilings, higher light outputs, and where, let's say, the merchants, be they chain stores, the large users, are working with contractors and purchasing at, at very sharp pricing, this works.

What we were challenged when we had our stakeholder meeting last week was what about that mama/papa store, what about that individual store. So we've gone back and looked at that, and come up with what we think are some ideas to address that type of retailer, as well. And obviously, a first

cost will be offset by energy and other benefits. Sometimes maintenance improvements, as well.

The methodology that we used was actually interviews with designers, contractors, large distributors, lamp manufacturers, and, and others, even a few end-users. We did some life cycle cost analysis. These are all detailed in the report. The efficient designs. Visual observations of current spaces is one of the things that we did. We, including a tour of a brand-new mall that opened up about less than six months ago, as well as numerous tours of what I would call regional or even strip malls, local malls, to see what types of, especially with the mama/papa stores, this is after our -- actually, these last ones were done after our shareholder meeting last week, of, of what they're really doing out there as far as the base design.

And then some more detailed computer models using AGI, were the big box retail, high center atrium, medium retail, precious jewelry and a designer fur, dresses type of a, a wide breadth, I mean, you could do many more models, but we kind of picked four of them that were really very divergent for the simple reason that it might represent a wide range of the kinds of spaces we'd be dealing with.

Next slide.

Now, interesting on the surveys, this is one of them. Recaps of one of the first surveys, and these are the two things that came from the surveys that were real interesting, and we had -- we actually had about 75 that we sent out. We really got 50 responses back, 47 interviews, three people said they were too busy, couldn't do it, didn't return. But the two main items that shine here, and you should have your hand-out -- did everybody get those hand-outs, do you know? There were two of them --

SPEAKER: They're available on the table as you come in.

MR. BAUER: Okay. Because you won't read it from here, obviously. But that the use of more efficient improved technologies was, this light blue and this purple, was use of controls. So these are the two things that the people we surveyed really felt were the main drivers that would allow us to, to look at reducing LPDs and, and actually improving the energy.

We asked specifically about the use of CMH, ceramic metal halide. Would it be an, an effective alternate for 2008. And by and large, close to 70 percent said good or better on that. And controls. Oh, this one, this is real

interesting. I started this, I have always been one who did not like exemptions, and I was saying let's get rid of all the exemptions. Well, when we did the survey, I found that wasn't very popular idea. Sixty-seven or greater said that's an unacceptable idea, so we have not touched exemption. And whatever exemptions are in '05, we are recommending stay in '08.

Now, controls. This is one, again, very popular, 72 percent of those surveyed said yes, controls is kind of a good way to go. And had we had time, I could tell my little San Francisco street story of looking at two different retailers, one that uses a lot of energy but excellent controls, one that uses the latest thing in the world, but doesn't seem to use their controls. And at the end of the day, guess who's using more energy.

Next one, please.

Okay. We looked at ceramic metal halide against, this is a 75 Watt reference. The other lines that follow are two IR lamps, the 60 and now the, the newer 55 that's available, and a 20 Watt CMH. And you can see here that CMH has a hard time in the lower wattage of being able to, to meet, and so we've backed off on being able to say that that, for now, is going to be a panacea for

lower ceilings.

But as you get to a higher ceiling, and especially how you purchase this, this is against a 120 Watt reference halogen, again, a hundred Watt IR, a 90 IR, and a 39 Watt CMH, there begins to be -- and, and this is based on what I would say the, not the mama/papa individual purchaser, but it is the store that is purchasing the chain or the large user, and with the price point that they pay for luminaires and lamps, it appears as though they have the ability to switch to that.

Here's the other thing we did in our survey that's very interesting. This is this new mall, there were 70 stores in it. Our rating of one to five, none means these guys evidently were under a rock because they didn't know where any kind of new technology was. Five meant that they more than likely -- well, not more than likely, they would meet the proposed 2008 standards that we have, that we're proposing today, because they are using CMH T-5 LEDs, all that kind of good stuff.

The ones in the middle, which is a good 30 percent, have some of this new technology in their packages today, certainly, although this mall opened up six months ago would've been permitted under '01, this whole group from here on

virtually meets '05. This one's a little questionable. This and this definitely meet '05. This definitely meets '08. About half of these stores we didn't break into that detail, but half of these stores might also meet our '08 proposal.

Next slide.

As far as a little more information on our analysis tools. The AGi32 software that we used for detailed lighting analysis, and for comprehensive lighting modeling. For less fancy modeling we used Excel spreadsheets. We looked at some of the Excel spradsheets that were developed in 2005 standards, and adopted those with our recommendations for equipment to 2008. And we also used them to evaluate our models, both our, our '05 and '08 model comparisons, and we used them for our cost comparisons, as well, the Excel spreadsheets.

Next.

Just one of the more detailed models. This is a large store with a high atrium. And what we've done is given you a recap of based on the design equipment to meet an '08 standard that we're proposing. The general lighting is actually above the current .9, which, by the way, we're not changing for '08, at 102, but the floor display is quite low at .33, the walls at 11-8, and the

ornamental is 3-9. This one actually, quite honestly, would, would have a tough time meeting even 2005. But you could probably look at controls, daylighting credits.

But what is interesting is on this particular one, it doesn't need to meet it because if you look on the side table, it is 161, and today we have 170, we're not, we're not changing that for 2008. We're still staying under the area -- method. You would have 1.7.

I just happened to remember, because we changed this number this morning to represent '08. The '05 model for this is 1.69. So the '05 model has slightly less efficient luminaire lamp package, still meets the current '05 1.7 Watts per square foot, with the new technology would do even better at meeting the 2008, what we're recommending is the 2008s to be 1-7 on the area method.

Next.

Now, this is a model of a high end jewelry, a partial model. We actually, this is based actually on real design. There is a store very similar to this that we used as the basis. And again, if you look at a recap. Our general lighting here is about a half a Watt. That includes cove and a fill-in of compact

fluorescents. Our floor lighting accent display is only about .30 Watts, because that would be only the accent lights that are directed at some free-floating cubicles and so forth in here that don't actually show on this rendering, but are there.

Our wall display is small again, too, because the only real -- and this shot doesn't even show it, but there would be some latrines and so forth in the actual design. We're using the valuable display category, which is calculated per square foot of case, that's 11 Watts a square foot on this particular design. And again, admittedly, this particular design is using T-5 and TMH.

Next.

Same one, with a advanced design using compact fluorescent and CMH. And we have again similar, this is a kind of a record. General lighting at about a half a Watt, floor lighting at .85, and wall lighting at 10-5.

This compares a number of areas, and if you look at the first one, this is the power density that, that we -- I should have a sheet up here myself, to read this. It's, it's one of these things which is a, a bad rule of Power Point, doing something so small that nobody can read it. But we needed to have the information

shown.

So what we have is the power density of the design, the first, first column here. Then we have, this is on the, on the, these are -- this is the design -- this is the actual design on an '05 model. This is the allowed '05. The yellow would be a design using the technologies to meet an '08 standard, and this is what would be allowed actually for the '08 standard.

And for example, one to look at would be probably high end jewelry, because that number was very low, and that number was only about two Watts, a little over two Watts a foot, but actually, if one were to follow out all the numbers that we have in our recommended changes, you could still have close to four Watts a foot in that design. That would assume that you would not use CMH for everything, but would use some halogen in mix. It might also then assume that you'd be using some T-8 lamping as opposed to T-6.

Next slide.

This one is actually the basis for our wall LPD recommendation, and what we're starting with is a 60 Watt, goes down to a 55 advanced, and/or we're also going to look at MR 16 IRCs. The first line here is essentially the basis for what I understand as being the 2005 model. And

that is that the 2005 model uses a T-8 and 60 IRs, and produces an actual 30 Watts a foot on the merchandise area that is pro-rated over the space. Seventy percent, 70 percent of the space is assumed as not having this. So when you take that back out, that's how you come up with 21 Watts a lineal foot.

The actual equivalent if we did nothing more than change to the 55 Watt IR, would go down to 25 Watts a foot, or 17.5 for the aggregated average. And so we're saying the base level is, is the base level. This is a very low cost adder, and it's cost effectiveness should be well within two years or, or even less.

Now, on the other end, this is the maximum potential if one were to use a 20 Watt CMH in its place. With the equivalent in the illumination dropping down to 15-4, down to actually aggregated 10.8, almost half. Obviously, the cost adder is high, or very high, and the cost effectiveness is limited, maybe seven and a half years plus, maybe 15 years for the big user. At today's purchasing and availability, probably not cost effective.

So what we've looked at is, again, both for those retailers that wouldn't -- but believe it or not, there'll be some retailers that pick

that, just because they want that light anyway, because they feel it's a better light than the incandescent. Totally different reason, but that's not what we're here is to say that retailers should be using CMH instead of incandescent for jewelry. But that happens to be what really happens in some cases.

So we're looking at two other equivalents. And again, all of this that we're looking at is based on still being compliant with RP-2 and the recommended light levels that RP-2 says for general lighting, accent lighting, et cetera. So we're saying two ways you can still get to a number, and we're recommending, we're proposing a number of 16-5 instead of 17-5, one Watt lower than what actually the technological kick would be, and that is saying that if you can live with ten percent less light, which you should be able to do under the RP-2 scenario, and one less light point in a run of, let's say, 30 feet, one could use the 55 IRs and the 4.9 Watts, let's say the seven, what -- we're going from ten Watts to seven Watts on the fluorescent. One could get to the 16-5 with ten percent less lamps.

The other scenario might be the well, I need all of those X amount of points of light. I need the ten points of light, let's say, in this

30 foot. Then one could go with a 50 Watt IRC, which would admittedly have a, in the same ten degree beam pattern, have about ten percent less light, but you would still have the same amount of light points. So in both cases, these scenarios require you to use about ten percent less light.

Next. Yes.

MR. SHIRAKH. I'm sorry, you're going to need to come up to the podium. I know it's more convenient to be seated, but you could probably sit next to Jim right there, if you have substantial discussions. That way you don't have to go back and forth.

MS. DAVIS: Yes. This is Leslie Davis, with Auerbach-Glasow Lighting Consultants. And we do a tremendous amount of retail, as well.

Could you clarify on this chart that your beam spreads are all for spot lamps?

MR. BAUER: They're all for spot lamps, yes.

MS. DAVIS: And not narrow floods, or anything else.

MR. BAUER: They're all, they're all using ten degree spots. The halogen is using a ten degree spot, and the MRs and HID is also using ten degree spots.

MS. DAVIS: Thank you.

MR. BAUER: And the reason we selected spots rather than flood is what is here is actually layered, also a fluorescent overlay on this. So it's not that alone. But actually, if you look at the model that we did in the detailed report, when you get an opportunity to, to look at that, you'll see that it's pretty darn uniform at a three foot spacing with a spot. That there's not a significant -- and I think you, I don't know if you saw that rough draft because you were part of the stakeholder package.

MS. DAVIS: No, I just, I just saw your Power Point.

MR. BAUER: Okay.

MS. DAVIS: Since I wasn't there. I was online.

MR. BAUER: Next slide, please.

So here, the recommendation and the rationale for a wall display lighting lowered from 21 to 16-5. The logic, you can achieve with the use of height efficiency T5 and latest IR/IRC lamping with only a ten percent minor light loss. The same goal as the 2005 code. Alternate to light loss design -- the alternate light loss designs still complies with IES RP-2 for display lighting, because we're still at ratios that are five to one or greater.

And CMH is not required to reach compliance in the lower ceilings and/or lower light levels. However, the last bullet point, if you feel you have a design desiring significantly higher illumination, or you're dealing with relatively high ceilings where CMH appears to have a better payback, then yes, you need to go to CMH.

But if we do not do away with the height adder, for example, you still may not need to do, use CMH in, let's say, 12 foot ceilings, because right now in a 12 foot ceiling you're dealing with 1.5 Watts -- I've just kind of switched gears here to floor, which I really shouldn't have, but -- well, let's, let's hold that until I get to, to the floor. Let's go to the next slide.

This is the floor display model, so we'll get to, to that. This is admittedly not a full model. We didn't do the walls on this, we just did a very simple quick room. And again, what we have here, this would be essentially a floor display, what we, what I call the 2005 model, on an upscale, using compact fluorescents at .9 Watts per square foot to generate the ambient. And then using in this case 55 Watt IR, IRs, replacing sixties. So that would give us the maximum allowed accent at 1.35 versus the 1.5 that we have in the current code.

That adds up to, not counting the wall or other decorative lighting components, three -- or, 2.25 for that space. The ambient, turning off everything and just looking at the compact fluorescent, gives you about 44 foot candles. The average, when you have the display accent lighting component turned back on, the average actually for the room is like 75 foot candles, and the average accent point, the center beam, the mean center beam is averaged at 360. Obviously, because some of the -- we have aimed better than others, we have, we have some that are 500, some that are down to 200, but the average, when you averaged about 14, 15, 16 points together, becomes about three, three and a half, 360 foot candles. And it's, it's an IES RP-2 compliant model.

Next.

Now, this, what we call a 2008 model, was strictly addressed to answer the questions that came up at the stakeholder meeting about well, what about mama/papa. Yeah, the big chains and that, you know, they can get a, you know, a lot of them are doing CMH already, they can good prices. But what about the person that's just doing one little shop and they want to use track light, which is -- and they're paying expensive, exorbitant prices for a metal halide track head

fixture and lamp.

So before we did this model, we went out and surveyed most of the area strip malls, and so forth, and the other regional, minor regional malls where a lot of these mama/papa stores would be located. And what we found was that by and large, there were many more of them using Troffer designs than compact fluorescents for their general lighting element.

So working on the assumption that that's what they would more than likely use, are Troffer designs, one can get with the latest generation of the T-8 Troffer and ballast, lamp and ballast package, the same ambient foot candle, or pretty darn close. We were limited here because we also assumed that if they're using Troffers they're going to use tile grid ceilings, and so we placed two by fours in logical tile grid arrangements, where the compact fluorescent, you can, usually you associate it being used with sheet rock and you can, you know, kind of place it wherever you want.

So based on that, we're saying we can get the same ambient 40 foot/candles. The average is 72, a little bit lower. The accent ended up being two points higher, but it's -- nominally, these numbers are close enough that I think we can

call them equal, if we use RP-2 standards, which say that you can have deviation of 25 percent, 12 percent plus or minus. These are much less than that. And again, it's, it's a compliant store, from an RP-2 standpoint, for the general and accent lighting component. The foot/candles are there, the ratios are there.

Next, next slide, please.

So our recommendations. The floor display goes down from 1.5 to 1.05, even though we realize that if you were just doing a technology change and you were using all .9 Watts for your general lighting, you would have a hard time because you're at 1.5. But what we're saying is in this same scenario, where we're -- or you use CMH, but where we're trying to respond to those that don't want to use CMH but yet could live with a design that is slightly lower in light level, still meeting RP-2, however, the logic says that for that it's still RP-2 compliant, it's more representative, really, of the typical strip and independent retail store, lower general lighting LPD, what we can do is we can still use, instead of using CMH, we can still use that halogen lamp because we can borrow from the general lighting that we're not using. So we end up getting, again, a similar, as you saw in the two slides,

very similar light levels, very similar accent points.

And again, if designs want to use a less efficient general lighting system or the desire much higher light levels, then, yes, they would need to use CMH. One other caveat that I would say that we, we didn't dial in here, but some of the free-standing walls, I know one high end men's store in our local area who is not a chain, but again, who probably, from when I look at the space and how it's designed and the kinds of MR-16 and compact fluorescent and fiber-optics that's being used in that store, that that particular kind of merchant would be funded up front to be looking very seriously at CMH, as well.

So we were trying to really address those that would be thinking the track light scenario because it's cheaper, not because they like track light. And in that case, we feel that most of those are, from what we've seen in our surveys, they're going to be looking at the larger Troffer fixture.

Next slide.

This brings us to our controls. Very quickly, this is the room we used for a model, a typical 2500 square foot soft retailer that would be very representative of what, again, we'd find

in the same mama/papa store.

Next slide.

A recap of the cost effectiveness, as well as the goals. And what we're saying is we want to look at doing away -- not doing away with, but if you're going to accept Title 24 tailored method, you ought to accept the more sophisticated control package, which would mean something more than just a timeclock that you use in an off position and on, and never use it any further. So what we're saying there is that this would include the ability to control multi-task zones, multi-level control and sensors, and also the ability to tie into load shedding. All of those things.

What we're saying there is the total annual savings for this little 2500 square foot store, based on 13, 14 cents a kilowatt hour, is actually close to 2,000. The energy savings is only about a thousand. You have almost a thousand in, for example, if you are using, whether, even if it's a halogen IR, you're talking about the price that the mama/papa would pay at 15 to 20 bucks for a advanced generation IR, you have a lamp avoidance there, too. So all these are various things coming into mind will give you almost a $2,000 a year savings. The minimal, or the cost over a timeclock for just the equipment,

some minor wiring, the equipment mostly, is about $4200, in the prices that we checked.

So that would suggest that you can do this in about a 2.2 year payback. We haven't, we do want to have the report having more detail, actual cost analysis, but this one is kind of a no-brainer, in my mind, that there should be more retail spaces doing this today because it has some big advantages to it, as opposed to just coming in when the first employee comes in at seven, all the lights are on, and the person that's working late at 9:00 o'clock at night forgets to turn everything off.

Next slide.

So here is our actual code language now, for the key tailored night items. General lighting, we're not touching because, again, the -- other than the mama/papa retails, a lot of the other retailers are going to be gravitating and staying with the compact fluorescent. And in our studies we found that there, although there's some longer lamp lifes coming out in compacts, we saw nothing significant at this point in time that would say we could take a technology gain.

Our floor display goes down from 1-5 to 105. Our wall display, and that was presented earlier, our wall display from 21 to 16-5, our

effects lighting from seven to six. There is in the report more detail of how and why we've done this, and it has to do with both our surveys that found in a lot of retail spaces they're -- are using compact fluorescent and LEDs, and so forth, already in these effects lighting, which doesn't necessitate the, the .9. And if they are using halogen, that's a raising incandescent like in a decorative chandelier, there are halogen options now in even the smaller decorative lamps that would allow somewhat of a hit.

So that is, as we understand, the original number was maybe a little, little arbitrary. Our .1 drop is following that same line, but saying that there have been enough technology changes that could allow that to drop.

The value, valuable merchandise area, that proportionately drops using the same analysis and assumptions as with the floor and wall display. And the valuable merchandise tops is, is the same thing. And what we did is looking back in that, is saying that you would still have some IRC MR-16 options if you did not have high ceilings that could get you the display lighting you need on top a case with the 15 Watt number.

Next.

And here's more detail just of our

controls. Obviously, egress and security lighting, that we want all the lights off except for the egress and security. Housekeeping controls, we want, we want to make sure that for housekeeping and stocking and other functions, that there is a uniform lighting with an LPD that is no greater than the maximum allowed general lighting for the space. We certainly want demand response tied into that, where you turn off selective lights as governed by the local utility, and obviously this would be a joint venture between merchant, designer and the local utility.

It can be done. For those merchants that are already using a more complex lighting system or a lighting control system, it's very little to re-zone that to, to work this way. We've done those studies for another utility. We know it works.

And display window lighting. We want to tie that into -- so that we separately control that potential for, to respond to both daylight and evening conditions.

With that, that presents, that's our formal presentation. The last slide shows the acknowledgement of the individuals involved in this, and we open up the floor to questions and

comments.

MR. SHIRAKH: Any questions for Bernie? Yes.

MS. DAVIS: This is Leslie Davis, with Auerbach-Glasow, again.

I applaud all of your hard work, because I know what it's like to do these models. I wanted to propose that there's a missing model in, in this research, and that would be the mid-size specialty store. In the past four years our firm has done a tremendous amount of this retail design, and to let you know kind of the area I'm talking about so that it's clear, I'm talking about the William Sonoma, Pottery Barn, Pottery Barn Kids, Gap, which also includes Gap Kids, Gap Body, Gap Baby. Banana Republic stores, Restoration Hardware, Smith and Hawkin, and currently Levi's, as well. They've just started a major program to build 50 to 60 stores this year.

In, in this type of model, we're seeing some differences from the models that you were showing, in terms of the type of merchandise display, and the type of proposed lighting therefore. They have a much higher percentage of wall display than was shown in your models. So we're looking at almost every wall having a six to seven foot high case fixture that needs to be

lighted, and that's their primary display surface. They are generally in the two to 5,000 square foot range, so it's the same size that you looked at for the high end jewelry. But in this case, there is no valuable merchandise adder.

So we've got, again, that mid-size store. The floor display area is basically everywhere they can put a display, except for egress walkways, and especially during holiday seasons, which there seems to be one at least every month, whatever their seasonal merchandise is. And most of these stores we're finding that we don't have the daylighting option because they're using the second story for their storage, in many cases. Or it's in a mall area that doesn't have a daylighting possibility.

To, to meet the requirements we've used super-high efficiency systems, the super T-8 systems that are a system in the, in the storage aisles with occupancy sensors, so that we can use that wattage as a trade-off to the sales floor. And then we're using primarily the MR-16 IRs, but we're using the narrow flood, so that we get broader coverage on the wall displays. And there we find that we get almost twice the output of the HIR PAR 38. So that's been our -- so we're not, we're getting more light by using MR-16 for that

beam spread.

We have, they've already incorporated this more extensive switching system that you've talked about, so they're using relay panels with timeclock controls. Their flagship stores, they're using dimming, but they really can't justify that in most of the mall level stores.

Additionally, we have looked at the ceramic metal halide, and again, because of the, the type of wall displays that we're looking at, the 39 Watt is even too high a wattage, so we're looking at the 20 Watts to replace that MR-16 output. And two years ago we did a study when they were just starting to bring out this equipment, and it was five to eight times the cost for equipment for the store owner.

Now, you can see these are people that, again, aren't the, the mom and pop store. They're, they're getting better discounts because they're going through national count distributors, and it was still coming in at $40 per square foot lighting equipment only for a 20 Watt ceramic metal halide track system.

We did another cost comparison last week, and it's down to four times the cost. Now, that was a combination recessed multiples and track system. But we're -- so that the track

system alone would be more expensive, more than four times the cost. And what we're finding is that it's, it's difficult to meet the 2005 codes right now and to do a good job for this type of store. These clients basically are trying to be good, good citizens, good Samaritans. They've, they've spent extra for these systems back of house and for the LED signs, and all of that technology, but they're feeling that they're going to be forced to start cheating. I mean, that's what we're concerned about if we don't do it.

We actually have, and I'm not going to state where because I don't want to get anyone in trouble, but in the past year in four different locales, one of them being in California, we were told that the inspector was not going to force compliance with the codes because they felt that it was unrealistic. And, and our concern is now that we, we're not trying to use more energy. We're trying to get a responsible code for additional models so that people will enforce them. We feel there'll be more energy savings that way.

Another thing that we found happen is in the remodeling, they have just cancelled some projects because they can't justify this kind of cost payback for the equipment, and therefore

they're continuing to use their 100 and 150 Watt standard incandescent PARs and ARs, and I don't think that's the way we all want to go, either. We want to get them to transition into newer technologies. And we feel that it is coming along, but for at least this type of model, it's not cost effective today.

I did contact two of the major retailers to ask them about their schedule, because I know that the state of California does always look at cost effectiveness. They're saying that because of depreciation, their tax depreciation usage, generally five years is the value that they're using for payback and turnover, that they will remodel stores every five years. One of them did say that they go up to seven years for one of their brands, but that's significantly less than the 15 years that we've used, and is reasonable for HVAC systems or, or standard building components.

MR. BAUER: I'd like to answer some of those and actually ask some more questions. And first of all, on your, on your models, would you be willing, or do you have client authorization to share some of those basic models with us that we could do some studies and further analysis and calculations?

MS. DAVIS: Absolutely. We'd be happy to do that.

MR. BAUER: Originally, we had a laundry list of I don't know how many models, and then it just came down to which ones to do or not to do, and the ones we elected, we were trying to be real divergent. What you're suggesting is another one that has its own divergency.

MS. DAVIS: Right.

MR. BAUER: And we may want to look at that.

The, the other part on the payback, we were using, or are using seven year paybacks. It came out of our surveys. What we found was people that were saying four and five, but also some that were saying eight or nine. We averaged it to seven, as opposed to the state's criteria for a 15 year payback. I'm totally in agreement with you, and that's why we did this other variant on 20 Watt CMH. There are people that will go to 20 Watt CMH because -- not because of the cost or anything else, but because they like the way it looks. They like the way the CMH looks better. It's a totally different decision, but that's what we're today, is to, to try to argue that it's a better light for certain kinds of merchandise.

What we have found is that when we get

to these higher ceilings and so forth, they're -- and especially in users like your category, mama/papa, is another not to sell, but the larger users are the chain stores, that, that begins, starts to become somewhat cost effective, especially when they're starting to look at the slot versus slot fixtures, as opposed to track.

Now, one of the other things that is in our proposal at this point in time, which is a little fine detail which somebody maybe hasn't picked up on, is that, for example, although we're saying 1.05 for the floor lighting, when one goes -- that's based on ceilings like 11 feet and below. We've changed the adder suggestion knowing that there's some deficiencies in what's available in CMH, as well, that the R kicker recommended kicks in at 1.3 multiplier at 11 and a half feet.

So if you're dealing with a lot of these stores, and I've -- dealing with a lot of them that are the, the 11, 8, and 13-5, where I was using eighties and hundreds, I actually have one -- on my floor display I actually have 1.34 or 35 in that kind of a store versus 101. This 101 is locked into my 11, 10 foot ceilings and so forth, where again, the MR-16 is a great lamp to work with. I'm a little skittish of using the MR-16s when I get into the 12 and 14 foot high ceilings.

MS. DAVIS: We, we've used them extensively for that application. And the 1.3 even is going to be a significant hardship for this type of model that I'm describing.

MR. BAUER: So if you'd share those with us, we're willing to run those and look at those, and, and then put that, you know, what we've, those findings into our total aggregate when we do our final report in July.

MS. DAVIS: Okay.

MR. BAUER: And I think there was one other one that I was going to mention, but it may not work for your stores. Again, we realize that the wall lighting component especially, and I use the florist as an example, Chanel, others, who have a lot of heavy wall lighting, and they use it, though usually it's individual, under-counter or shelf strips. So we were looking at an adder there for that type of retail, so not for everything. But let's say you had a hundred foot of wall, most of it was lit like the '05 model, but you had this 12 foot feature with seven shelves lit. You would get an adder for that versus the base model that we're suggesting at the 16-5.

MS. DAVIS: Bernie, I'll also supply some photographs of these typical stores to be

able to explain and support.

MR. BAUER: Good. Thank you.

MS. DAVIS: So we've got --

MR. BAUER: We appreciate that much.

MS. DAVIS: -- existing stores that have been installed. We can give you hard data on energy. And all of them were designed to meet at least ASHRAE 99, most of them later, and, and always in California we're using the Title 24.

MR. BAUER: Okay. Very good.

MR. SHIRAKH: I have a question for Leslie. These incidents of people having the urge to maybe fudge or cheat, that's, those are based on the 2005 standards; correct? I mean, they, they feel that they can't adequately light their store using the 2005 standards. Is that the --

MS. DAVIS: We typically in California, up to this point, have had good compliance. The 2005 did drop them down, again, for this type of model, to where it's very difficult to comply. One of our stores in southern California, they have a large portion of the store that has no accent lighting on merchandise displays, because --

MR. SHIRAKH: And these are, these are medium size stores that you were talking, Banana Republics and so forth.

MS. DAVIS: Correct. Yes, that one particularly was a Gap store. And we don't want to have our clients go to the point where they're looking for ways to get around. We'd like to help them comply in a reasonable manner.

MR. BAUER: I, I would actually add, too, to Leslie's defense, I have a mouse store, call it mouse. It's, without mentioning exactly who it is, but maybe pointing towards the owner, that, I mean, it was a real hard push, and now they want to add more decorative. And we've already used all the decorative allowance on the color kinetics, but we've got a lot of color kinetics in there, much more than I would necessarily put in if I were left on my own. But again, the client's final push.

And yet I have, in that instance, I have a lot going on on the walls to small space. I don't have that many things going on on the floor. So I'm way under on my -- instead of 1-5 I think I'm like one on my floor, with 60 IRs. And on my walls I've got MRs, and I'm, I could use a little bit more. So we're still entertaining, and that's why that little purple thing wore out, but on our final proposal, if we can come with a way of doing some trade-off between floor and -- just internally, within the retail, between floor and

wall lighting, and I see Gary shuddering there right now as I say this, because what I don't want is the cheating that all of a sudden a two by two is, just because I've got it next to the wall, it's my wall lighting. Or just because I've put it over a fixture, a two by two or a compact fluorescent downlight is a accent light.

But if we can come up with a way of defining these, this would help offset some of the lower base numbers that we're suggesting, because it would give, in those unique design problem areas where we maybe need to get a little bit more, that we're still not going to go over what we agreed to as being our total anyway, but we're allowing the designer to shift back and forth within the display.

The second part of that would be, and I would still say we use perimeter lighting functions, we use general display lighting functions, to calculate what our maximum is. Then we still define that these are luminaires that are directional when we do our report back in, but we don't have to pull them in the chart that this is wall, this is floor, not only will it make designers happier, it'll probably make building inspectors much happier, as well.

So that was just another response

actually supporting what --

MR. SHIRAKH: The point that Bernie is bringing up is to -- you know, right now we have a separate allowance for wall displays and a separate allowance for floor display. And then we have some criterias built in there. For instance, if a, if a fixture is within six foot of the wall, then it's considered a wall display. If it's more than six feet away, it's, it's a floor display. And there has been some suggestions that it's not being enforced, or designed that way and it's not being implemented. And that's the basis for this argument that we should have maybe just one allowance for both wall and floor.

The concern that we have is that that might actually amount to a loosening of the standards. That, you know, you don't have any wall displays, but you still get to use all of that on your floor display, and that goes a little bit counter to, you know, what you are hoping here. But there could be ways of doing it without sacrificing energy, and we're open to that.

The other concern that I know Gary Flamm has, maybe just use all your allowance on the floor display and you don't have any wall display. And basically, you don't have anymore accent or contrast lighting anywhere. If you light up

everything to a 500 foot/candles, then there is no contrast.

So those are some of the issues we're grappling, and, you know, would agree that we're going to put it on the table and hope to get input from the public on this issue, and others. I think Jim is anxious to jump in.

MR. BENYA: Thank you. Jim Benya, Benya Lighting design.

First of all, I'd like to say this has been a bit more challenging. As we, as we started out talking about the, the indoor issues raised by PG&E are, are much harder to get our arms around. And we've had workshops on this, as well, not to mention phone conferences.

Unfortunately, unlike with the outdoor lighting, where I think we had a very successful phone conference and reached a resolution prior to coming here, we didn't do that. We weren't able to reach a resolution on the indoor. So I'm going to raise some of the issues so you know what some of the things we're looking at are, that, that need to be said about this.

First of all, PG&E is proposing rather significant reduction in display lighting allowance. At the same time, ASHRAE IES 90.1 is going up. 90.1 recognized that the 2004 and the

subsequent proposed revisions were, in fact, unreasonably constraining display lighting much the way Leslie was describing. And so 90.1 is revising its retail standard, which will be increasing the power allowances in many ways.

And this has been something that was just out for public review. I'm not sure, I think the public reviews were due yesterday, or something like that. So it's, it's, 90.1 realized that this is a very challenging area.

Number two, and I want to reflect upon my own experiences, that Leslie pointed out, my experience is very similar to Leslie's. And designers across the country are raising concerns now about how every code standard revision cycle, retail gets squeezed. Retail is one of the most demanding areas for lighting in, in all of what we do. And the continuing pressure to reduce it every time, there, frankly, folks, haven't been any significant technology breakthroughs since the last time we got together. There just haven't. And usually, we need a technology breakthrough to allow us to significantly reduce the allowances. There just simply haven't been any.

Conversely, the costs, as Leslie observed, have not gone down significantly. We had hoped to see the ceramic metal halide display

a luminaire that would cost under a hundred dollars, and a lamp that would cost under $20, and it just hasn't happened. The cost of the lamp and luminaire and ballast and everything has stayed constant since we studied this for the 2005 standard.

So one of the problems we had hoped to see is electric rates would go -- we hoped to see electric rates go up, but we expected electric rates would go up, and we hoped that ceramic metal halide costs would go down, and the cost effectiveness would occur. And it just hasn't really happened.

One of the things that I'm going to point out is that I have some personally, from my calculations and modeling for 2005, and checking Bernie's models against ours, there's, there's a number of issues that I'm going to bring up here.

First of all, when we took a look at the cost effectiveness for the 39 Watt, Bernie showed a slide where it appeared that the life cycle cost of the 39 Watt was superior to the life cycle costs on halogen lamps. According to our calculations, they did not take into account lumen depreciation. If you take lumen depreciation of the ceramic metal halide into account, the halogen continues to win on a life cycle basis even in 15

years, as compared to the 39 on ceramic. I still believe the ceramic metal halide does not become cost effective until you get into the 70 Watt class.

With regard to the models that, that Bernie's showing, they're different than the models that we used in 2005. And this is particularly critical because you may recall some, a couple of models in which he showed illustrations, renderings. One of them showed a number of flat display elements in, in a room, and he used that to come up with the floor display allowance. The problem is he didn't do 3-D modeling on the displays.

If you only light the top of a table, in other words, flat displays, you can use less power. However, if you added three dimensional elements such as a mannequin, or a bookcase, or anything else that has a significant amount of vertical display, that changes significantly. And our modeling was based on a ten percent floor area coverage of nominal six foot by four foot floor displays that had a vertical element in the middle of them, and the vertical surface was also lighted to meet RP-2.

I do not believe that in the models that Bernie was showing, that you have adequate

vertical illumination, particularly if you put three or four-sided elements in the middle of those tables and you light them to the same levels. I think you'll find that you didn't have enough wattage.

The, getting back to, to the requirements of when you make a proposal to the, to the state to, to make a change, it's got to be cost effective. Leslie brought up the cycle of the, of the analysis period. In 2005, we made the point that for retailers there was a five-year cycle. It had to do with both leases and remodeling. In the, in the modeling, the TODV requirements we're supposed to be doing this time, we have been using 15 years because that's what's been mandated.

What happens is if you shrink it to five years, the ceramic metal halides simply are not cost effective. If you keep it at 15 years, they're not quite cost effective up to 39 Watts. In other words, the break-through we were hoping for hasn't occurred yet. LEDs haven't changed the equation, either.

Another calculation, ambient light. I don't know. One of the things we have not done is we have not checked all of -- and tried to replicate all the modeling calculations that

Bernie and PG&E have done. I had a problem with one. I tried to replicate their ambient light levels using compact fluorescents. They're claiming 44 foot/candles at 0.9 Watts a square foot. I can only get to 26, using a Lithonia compact fluorescent downlight.

So I think there's, I'm, I'm concerned about the modeling, the data that's being used, and how they're coming up with the values. These need to be checked very carefully.

One of the other problems, of course, with controls in retail. Most of the time retail lights are turned on and left on, and so the peak impacts are pretty minimal. You can do a little bit of load shedding in retail, but it's kind of hard to do, particularly if you're doing a lot of display lighting it's kind of hard to turn off lights to, to address peak problems.

So the savings that Bernie was talking about, many of them are, they're real savings, but they tend to occur off peak.

I'd agree with Wesley on the beam spread. We tend to see the, the narrow flood type of distribution used more than the spot and more than the flood. It's the one that seems to do the best job in between, and so the majority of our work uses those types of sources. So in general,

yes, there is quite a bit of distance right now between PG&E and, at least myself and, and I may be speaking slightly for our team. We've got a lot of things to resolve in this area.

One of the things that we, that I will, I will say, there's been one technology improvement that we could harvest, and we had talked about harvesting, and that is, is that the, the introduction of the, what you might call the super IR display lamps, the super IR display lamps allow a drop in wattage of ten percent to maintain roughly the same -- maintain the beam lumens. The problem is, is that there's no increase in lumens. And so the lumens are taken from basically the field, or the, or the uncontrolled light that adds to the ambient, and they're pushed into the beam.

For display lighting, the net effect is yes, you can reduce the wattage. But it also reduces the average light level in the space accordingly, because you're stealing the lumens from general lighting to, to pay for display lighting. So there's a side effect to using them. Nonetheless, that is a technology improvement.

And we also talked about using the T-5, super T-5 technology and low ballast factors, which would improve valance lighting. And so a proposal that, that concentrates on those two

technical break-throughs in normal retail. It's probably workable, but those are the only ones I know of.

In high bay retail, big box, et cetera, there is a significant break-through, and that's the ceramic metal halide and the electronic ballast. And we are recommending that, you know, there be a significant change in the allowances for those spaces for general lighting, because we can see a net 20 to 25 percent reduction, and there's, it's cost effective and there's literally no change. Actually, it improves the, the retail lighting.

So those are some of our thoughts, at least some of my thoughts, you know, about this. Like I say, I'm sorry to say we haven't been able to resolve it, but these are the reasons why.

MR. BAUER: And a, a general comment. Yes, I would entertain that we look at the models closer, would welcome you to look at those numbers. One of the things when you mention the -- it's interesting, when we did our quick mini-model, and it was a quick mini-model, and we certainly want to go back and examine those with three dimensionals. It's, it's a good point. But we also came up with our first one with the 26 foot/candle. But we looked at it with a compact,

and it was a Lithonia, but what we found was a Lithonia particular one with a certain ballast and a package, and it happened to be, have a, have a lens on it and white reflective. When we looked at another Lithonia, it was a 48 Watt, I think, total load on it, and we ran that optics into the AGI-32, that's how we came up with the 40-some foot/candles.

And again, the numbers that we are using we're, we're assuming, we're making the assumption that one is going to do some group re-lamping on this and not wait until end of life on the re-lamp, because if you do that they will drop another good ten, fifteen points.

MR. BENYA: Jim Benya. Just very quickly. The calculations I've been using have been based on a very high light loss factor. So in other words, we're not, we're not being overly aggressive about the light loss factor, so I would agree with you on that point.

MR. BAUER: Okay.

MR. SHIRAKH: Any other questions, Bill?

MR. PENNINGTON: A couple of comments. We're very interested in doing anything related to demand response in this round of standards. So the comment that you made that there is some potential for load shedding, you know, strikes a

nerve. We would need to be very explicit in the standards about what it is that we're doing to accomplish that, and I don't find that specificity in, in the language that you're proposing.

MR. BAUER: Well, I, I believe that first of all, the load shed is going to come from another proposal, from one of the other utilities. What we're saying is in adopting our more comprehensive control package, that one will need to have the ability to do load shedding. And load shedding is, is really more not so much well, I have different equipment, but it really starts with how you design that store. Several of the retail stores that we, we looked at and some modeling that we -- not really modeling, but analysis, spreadsheet analysis and visuals that we did for this other utility, were to look at different types of stores and their ability.

Now, a number of retail stores have ambient levels that yes, are they the kind of levels that they should be doing business as usual with, with accent lighting components and that? No. But do they have base lighting levels where, for example, they could keep all their general lighting and all their regular perimeter light, wall lighting on and still be open for business at least from the minimal levels of RP-2 for just

merchandise evaluation, not merchandise pizazz, at this point, but merchandise evaluation? We believe the answer there is yes.

And yes, it would not be a well-designed store under load shed. But what we're saying is everybody in the same mall would be under the same conditions, and they could still stay open and they could still sell merchandise, although it might not be under the old well comparison, it might be more like a Target or a Mervyn's does today. But they could still stay open. And that this load shed is not going to be something, hopefully, that happens every day. But according to the guidelines that were given by us from the people at the utility that has us do that study, is it would be, you know, several times a year, or --

MR. PENNINGTON: So what study is that?

MR. BAUER: It, it's one that's being done that I believe probably Southern California Edison is going to present. I'm not a hundred percent sure on that, but one that they're probably going to present for load shedding.

MR. PENNINGTON: Okay. I'm not --

MR. BAUER: So I think the big key --

MR. PENNINGTON: -- I'm not clear on that.

MR. BAUER: I think the big key --

MR. PENNINGTON: Maybe, maybe John can help me in a second. I'll go on to another question. It, it seems like what you're talking about with ceramic metal halides being cost effective at, at higher ceiling heights, that maybe we need to be thinking about sort of a different construct for dealing with ceiling heights, that, that our past approach has been as ceiling heights go up the wattage levels go up. And maybe there's some break point where the wattage levels actually go down the higher the ceiling gets because you come into a, a area where ceramic metal halides are cost effective.

And maybe if we were, you know, above a certain level, the, the LPD should be associated with ceramic metal halides, and maybe that's actually a more aggressive proposal than what you're thinking about.

MR. BAUER: Well, that's an interesting one for us to look at. We had not looked at that, but we certainly could look at that. The other thing that we have bantered around is the possibility of doing away with the height multiplier altogether. I would say that if one accepts our lower -- because our lower aggressive numbers are based on the lower ceiling package,

and I, I would be the first one to fight to keep our multiplier in the formula. If we're going to start out with 1.05 or 1.1 for that base level, then I would want that multiplier of 1.3 when I'm into my 12 foot ceiling.

On the other hand, if I was working with today's 1.5 number, I would probably say that the -- well, quite frankly, the multipliers, I have found them not being very useful, for the most part. Very, very, you know, one out of 20 or one out of a hundred, if that.

But I guess the key point is on this load shed, is again yes, it's, it's not meant that business is going to be at usual, but it's, what we're saying is, you know, what's the alternative. Brown-out and then black-out, and so nobody's in business for two or three days, as opposed to somebody in a lessened business condition. And, and from the engineers I've talked to on projects that we've worked on, and most of our clients already have multi-level lighting control systems, the incremental cost to -- even let's say display lighting could be broken into, into different levels, which is what we looked at for Southern California Edison, that said, you know, a store that's got super, a lot of display, you set your displays up in a hierarchy.

So you maybe have your key focal displays and your key wall display stays on, and the load shed first level, and the secondary displays go off, still having some punch light to get you into the space, to romance the space, but yet our general lighting and our wall general lighting, or accent, or, let's say wall wash lighting, to provide adequate illumination.

MR. SHIRAKH: So this expanded controls that you're talking about, is it just for retail or is it for all --

MR. BAUER: It's for tailored, period. If you, what we're saying is if you're going to adopt the tailored --

MR. SHIRAKH: Well, I mean, is it all the tailored categories?

MR. BAUER: -- tailored method, you ought to adopt a higher, a higher level of control than the current standard asks.

MR. SHIRAKH: So this would also apply to museums --

MR. BAUER: Well, the question is on the museums, and I think there have been some discussion within our, within our peer group that, you know, we want, we may want to look at museums a little bit differently. And we haven't put that in our proposal at this point in time, but we're

still open to --

MR. SHIRAKH: So it's not just specific to retail. You know, you're open --

MR. BAUER: But it's heavily on the retail, because, because the retail is, you know, like the biggest user of the tailored method. And, and quite frankly, because the area method is really pretty lean and mean, if you start to do any kind of retail that requires a lot of accent lighting you really need to go to the tailored method.

MR. SHIRAKH: So you need to be more specific as to which function areas this is applicable to on the, on the tailored method. So if you have only retail in mind, then it should say that. Or whatever other function areas you have in mind.

And the same question for DR. Is that again specific for retail, or for, for all tailored method?

MR. BAUER: Well, again, we're not -- the demand response thing isn't in our proposal, per se. We're just saying that the controls that are put in ought to have the ability to tie into that, as well. I believe someone else is doing that proposal, if they haven't --

MR. SHIRAKH: Jon, do you want to --

MR. McHUGH: Jon McHugh, Heschong Mahone Group, representing PG&E.

We, we have another case proposal around demand responsive controls that we're planning on presenting in July, and that's looking at demand responsive wiring systems for entire buildings. And at that point in time it'll also have a discussion of demand responsive lighting controls for retail spaces. In addition, demand responsive controls for outdoor signs that are on during the day.

And if you look at demand responsive controls, there's two levels of demand responsive controls, and there's one similar to what we've been talking about for PCTs, or Programmable Communicating Thermostats, which is an emergency response, and that's a response that is essentially a mandatory response. And on average, that type of control period is two and a half hours a year.

But having these controls allows people, if they so choose, to shed load for economic reasons. And given the discussions about peak pricing, critical peak pricing, those durations are probably more, more likely on the, on the order of 50 hours per year. So if you -- and typically, that would be during the summer,

talking about two or three hours a week in the summer.

So that's sort of the times that, that we're looking at, and also the timing of providing something to the Commission about demand response.

MR. BAUER: Okay.

MR. SHIRAKH: Any other questions related to Bernie's indoor lighting presentation?

Jon.

MR. NULL: Jon Null, from the WattStopper.

So in the 2005 code cycle we had made a suggestion about separating the different loads within the retail space, in terms of display lighting and, and also general lighting. And then at the same time, bi-level -- circulating each one in terms of bi-level so that there would be different times of the day that the timeclock could be, could control those in a different manner. For instance, display lighting could be -- have half-lighting for stocking, and then for full retail opening would be fully, fully enabled in the same way for the general retail space zones.

We also support the idea of layering controls. So, for instance, in a stocking situation there would be an occupancy sensor type

with a, a lighting control system that would only enable the lights in that stocking zone. And this may not support a smaller space, but certainly a larger retail, retail area. And so we, we've given to, to Jon sort of our, our original proposal from the 2005 code cycle, and --

MR. SHIRAKH: To Jon McHugh, you mean?

MR. NULL: To Jon McHugh, yeah. So that, that's the comments that we have from the, from the control side. Thanks.

MR. SHIRAKH: Any other questions or comments, Jon McHugh?

MR. McHUGH: I would just like to make the request of Jim that similar to Leslie's offer, if we can get a copy of these floor display models that you were talking about, that would be most helpful. I'd also like to thank the Commission and their staff on helping us refine the proposal. It's extremely useful to us, and I, I think we end up with a better proposal at the end of the day.

MR. SHIRAKH: Bill Pennington.

MR. PENNINGTON: I don't have a comment about that, but I do, I do want to acknowledge what Jon Null said. It's kind of interesting that, that these, whenever good ideas come they have legs and, and they have some ability to, to hang in there. And, you know, when, when this

proposal came in 2005, we said great, if you can fund the work we'll, we'll listen. And they said we can't fund the work, and so now here it's coming back with a funding source to pursue the good idea. So, me, I feel pretty good about that process. Thanks.

MR. SHIRAKH: So a number of issues still remain, and I guess we're going to be working on models along the lines that Leslie suggested. We're probably going to have a series of stakeholder meetings to resolve the remaining issues. It's probably likely that we're not going to bring these topics back in the future workshop; rather, we'll just work through the stakeholder meetings and try to work out the differences.

Steve.

MR. BLANC: Steve Blanc. Yeah, that was exactly what I was going to point out, Maz, is that, that we will be more than willing to lend our facilities and whatever resources we need to do to work things out, bring Jim down or whatever we need to do to get this thing resolved. And I'll leave it to you and Jon to work out some schedule for resolution of differences.

MR. SHIRAKH: If anybody is in the audience who is interested in participating in the stakeholder meetings let me know. The difference

is stakeholder meetings are less formal. In workshops I get to wear a tie. In the other meetings, I -- anyway, Gary Flamm.

MR. FLAMM: I was just going to say what you just said, Mazi. I think, you know, this is the -- the next formal step would be to red line the standards and get those out on the street, so there's going to be some informal meetings. And I think it's critical while we do that that anybody that wants to get involved needs to identify themselves so that we can plug them in. There will be, there will be ample time to review what we do when we redline it, but into developing the, the background work we need to know who wants to be involved in that.

MR. SHIRAKH: We spent a lot of time discussing the floor display allowance that went down from 1.5 to 1.0, but we didn't really discuss the case tops allowances and, and, you know, the very valuable merchandise. So we need to think about those two when we move to the next phase.

MR. BENYA: Jim Benya, Benya Lighting Design.

Yeah, the -- I think what we -- the proposal that's, that we all put on the table here is that we have a really, you know, knock-down, really get down to the, the number crunching and

really take a hard look together at the, at all of these values. And I think that's something we should be able to put together fairly quickly and, and at least, if we can't agree, at least know why we disagree, and agree that it's a, it's a level playing field.

There's a few things that have been left out of the calculations that we've got to get back into them, and then I think we can, we can either agree, or at least have an honest, clear disagreement of where we're at.

MR. SHIRAKH: Okay. Any other comments?

It's a little past 12:00 o'clock. I don't know about you guys, but I'm hungry.

I want to thank Bernie and Nancy for their wonderful presentations. This, we're going to come back here at 1:30, and we'll be talking about insulation requirements. It's a non-residential case initiative. We have a sign-in sheet outside. If you haven't done so, please do sign it, or attach your business card to it so we can know who participated. And we'll see you at 1:30.

(Thereupon, the luncheon recess was taken at 12:05 p.m.)

AFTERNOON SESSION

MR. SHIRAKH: I think we're going to get started. Some people are still missing, but they'll join us in the next few minutes.

We only have one topic area to be presented this afternoon, and that's the Nonresidential Insulation. This topic area was presented in October of 2005, and it received substantial public comments. And we think we've addressed it. We've had a number of stakeholder meetings and conference calls and so forth, so we'll find out soon if we've made any progress.

This was, this is a PG&E sponsored case initiative, so with that, I'm going to turn it over to Steve Blanc.

MR. BLANC: Good afternoon, again. I'm here to introduce our nonres case insulation proposal and, by God, all the stuff we went through, Mazi, I sure hope we've got it right this time, because I don't want to do anymore stakeholder meetings.

Charlie Yu from AEC is going to do the presentation, and this is our last one for today.

MR. SHIRAKH: And before Charlie starts, after Charlie's presentation we have a, a public, open public forum. Anybody can come up to the mic and talk about different topics. And I do know there's some lighting suggestions, so for those of you who are lighting, interested in lighting, you may want to hang around.

Charlie.

MR. YU: So this is the non-residential case insulation proposal.

Next slide, please.

So in this proposal what we're going to is update the 2008 criteria using the latest life-cycle cost methodology, and the last time the criteria was updated was 1992, so there have been some substantial changes to costing the insulation.

We're planning on moving to a U-factor approach. Basically, the prescriptive requirements right now, well, say R-19, and you can put in R-19 insulation to meet that requirement. But we feel that a U-factor approach will be more fair across the board.

We're also considering creating a separate category for retail occupancies. Retail

occupancies usually have higher internal gains and lower window wall ratios. And where we see the biggest difference with retail occupancies is with mass walls and floors, which we'll get into later on.

And we're also considering separating the climate zone groupings. This has yet to be completely tweaked out, but we've noticed a substantial difference between Climate Zone 1 and Climate Zone 16, so we're hoping to at least separate those two climate zones out. Right now, 1 and 16 are clumped together.

Next slide.

And the changes from this insulation report from the previous one is we updated the 1008 TDV Curves with -- these curves were just updated April 18th, 2006, and I believe the previous curves had a small error in Climate Zone 6, so we'll see some substantial changes to that.

We also updated some of our RS Means Cost Values. Thanks to Lee Schoemaker, we've changed the pricing or the cost to the standing seam roofs with rigid insulation. Now they have a second metal deck, and that was added for structural purposes. The screw down roof we assumed a cost of $1.74, and a standing seam roof we assumed a cost of $2.82. However, if there is

rigid insulation with the standing seam roof, it would be $2.82 plus $1.74 for the second deck.

And there is a slight error with the R-19 cavity insulation. It was actually 46 cents, not 48 cents. And all the rest of the insulation values were extrapolated with regression analysis.

From the modeling perspective, we moved mass wall, the modeling of insulation for mass walls from the exterior to the interior, and for wood-frame and other roofs, we decided to use the 24 inch on center with insulation underneath rather than the attic model as our basis. And for this report, we also included floor insulation levels, which we will probably need to discuss further later on.

Next slide.

So in order to determine the insulation values, we have a DOE 2 simulation model, and basically it's your ASHRAE model. It's five zones. It has a standard HVAC system. The caveat to this is we included an economizer. The reason why we included an economizer is because without one there tends to be a thermaspiral effect, where DOE 2 will over-predict heating and cooling.

Next slide, please.

So to run this through our life cycle cost analysis. In order to determine the TDV we

had our simulation model, and basically we modeled a building with no insulation, medium insulation, and high insulation, and we got a linear regression. Most of the R squares were pretty good, and from that we would plug it in to our TDV equation, which has a cost and a co-efficient, and we multiply it out by the U Factor that is contained in the joint appendices, and we have our TDV.

And so the purpose of this report was to find the minimal life cycle cost, which is the initial cost plus the present value of the TDV multiplied by the TDV. And the initial cost we used was just an incremental cost. And the cost data we gathered was from R.S. Means 2005, I believe it was Quarter 3. And from that we added a 30 percent operating profit, a 1.088 California adjustment factor, because cost means only produces nation results and city results. And we performed a regression analysis for missing values.

Next slide, please.

So basically we ran all the U factors in the joint appendices for the construction assemblies we evaluated, and we got a list of, you know, 104 different life cycle costs for Climate Zone 3. These are just the top ten. And

basically what happens is -- next slide, please -- when we plot it we get this J curve, and what we're proposing as this criteria is the minimal point on that J curve, which on this graph is .095, as the U factor.

Next, next slide.

So for these slides I'm just going to probably zip through them pretty quickly. These are just the results. On the left-hand side, the lighter blue, you'll see it's the 2005 standards, and on the right side it's the 2008 standards in purple.

Basically, a higher bar means higher U-Value, which means less insulation. On the bottom, you'll see the statewide energy impacts. These are weighted by occupancy type and construction starts by climate zone. We wanted to actually weight them by construction assemblies, for example, metal building roofs, wood framed walls, but we're still obtaining down the data for that.

So for here, you'll see Climate Zones 1, 3, 4 and 5. We're actually seeing -- 1, 3, 4, 5 and 6. We're actually seeing increased -- increasing the U-Value, which is decreasing the insulation level. But for the rest of the climate zones we're trying to increase the insulation

level. However, even if we're trying to decrease the insulation level in certain climate zones, the overall -- the impact is still positive. So at the bottom you'll see the PDV equals 0.222. That's energy savings with the proposed criteria. So a positive number is energy savings, and a negative number is more energy consumption with the 2008 standards.

Next slide, please.

So for the metal building roof, this is the 24 hour occupancy, it's fairly consistent to the current standard. The only drop is in Climate Zone 4. In Climate Zone 1, there's a larger U factor, but, you know, we're trying to separate out Climate Zones 1 and 16, so that's why you'll see a pretty big difference in Climate Zone 1. We believe the last time the insulation values were considered -- they used, they assumed Climate Zone 16 for Climate Zone 1.

Next slide, please.

If you look in the report, this is only shown in -- you'll see these coefficient graphs. And basically, what's driving insulation is a higher coefficient. So the higher the coefficient the more insulation is required, or is cost effective. And what we see is for 24 hour, more insulation is cost effective. And this is just

another way of looking at the previous two graphs. It shows the U Factor and what the construction assembly turned out to be. Can't hardly read it, but the second to the bottom is R-12 sheeting is cost effective for Climate Zone 6.

Next slide, please.

This is, we also did a cool roof sensitivity study. And basically, the 2005 prescriptive standards requires the cool roofs, and so we decided to model a cool roof on our base assumption model. However, we wanted to determine whether, what the effects would be if there was no cool roof model, and this is our results.

As you can see, with no cool roof model, more insulation would be cost effective, which is in line with our initial assumptions.

Next slide, please.

And we also did a study on our sensitive -- a sensitivity study on insulation, on economizers. And basically, we assumed an economizer, and it's not required for all building types so we wanted to know what the effect of economizers was on insulation. And if we took out economizers, less insulation would actually be required because of the thermos model effect.

Next slide, please.

So these are the results for the wood-

framed and other roofs. You know, pretty similar to the 2005 standards.

Next slide.

And this is wood-framed roofs for the 24 hour occupancy. The previous one was for daytime.

Next slide, please.

Next slide, please.

So here we're, is where we might get some more discussion. For the metal building wall, we see a significant drop in U Factor, and this, the drop is driven by sheathing insulation rather than cavity insulation, so we moved away from cavity insulation and we found that sheathing was a lot more cost effective. And so that's what's causing the drastic drop from the current standard to the proposed standard. And this is for the T-10 occupancy.

Next slide, please.

The same is true with the 24 hour occupancy. Next slide.

I should also mention that you can find the retail occupancies in the report, although we didn't include them in this slide show presentation.

The metal framed walls also have the same effect as the metal building walls, where sheathing insulation is a lot more cost effective

than cavity insulation. And that's demonstrated here. You can see a TDV savings, this is probably where you'll find the most significant savings on the metal framed wall, the TDV savings is 17.505. That's kBtu, and that's on a per square foot on an annual basis.

Next slide, please.

And the same results for metal framed walls.

Next slide.

For the -- this is the light mass or medium mass walls between the heat capacity of seven and 15. What we found was that for Climate Zones 5 through 9, no insulation was actually cost effective. And when we performed this analysis, it was actually quite different than what was done before, or not different, but previously if you look in the ACM manual, you'll notice -- or even in the current requirements, that the base mass wall has various different U-values. However, we decided to default all the mass walls to a four inch solid grout wall, which is a U-factor of 0.91. And so we performed our analysis based on that.

Next slide, please.

And for the 24 hour -- or, actually, we included retail occupancies here. You'll notice

that for Climate Zones 5 through 7, no insulation is cost effective, whereas for the rest, more insulation is cost effective. I guess this is because once you reach a certain threshold, adding on more insulation doesn't cost as much. So it's, basically it's breaking through a certain threshold.

Next slide, please.

This is the results for the 24 hour occupancy. And basically, we're requiring insulation, more insulation on all the walls.

Next slide.

And these are for the heavy mass walls. They're -- for Climate Zones 2 through 10, they're remaining fairly consistent to the current standards. However, for Climate Zones 11 through 16, we're proposing reducing the insulation levels.

Next slide.

And same for retail. Next slide.

And same for 24 hour.

Next slide.

These are the results for the wood-framed and other daytime occupancies. Again, Climate Zones 10 through 16 were seeing a drastic -- or not drastic, but a decent reduction in U-value for, for the insulation levels, but the rest

remain fairly consistent.

Next slide.

And this is for the 24-hour occupancy.

Next slide, please.

For the mass floors, we noticed some problems when we did our regression analysis. The R squares weren't quite near one, and a lot of them were actually near .5. And so we actually did a separate analysis using Energy Plus rather than DOE 2, and we noticed the same thing, which is more insulation actually increases energy consumption, and we thought that was fairly, a fairly interesting find. And that's applicable to Climate Zones 3 through 10.

Next slide, please.

For the retail occupancy, it changes a lot more than the daytime and the 24 hour occupancy, we believe because of internal gains. And as you can see, no insulation is cost effective for Climate Zones 1 through 13.

Next slide.

For 24 hour occupancy we found that insulation is actually cost effective. So that's just kind of a broad range results.

Next slide, please.

And these are coefficient plots for the mass floors. As you can see, some of them are

actually into the negative, and the negative coefficients actually represent an increase in insulation will increase energy consumption, so that means insulation is bad. Or not bad, but not cost effective.

Next slide.

And these are results for the other floor. For these we assumed the 16 inch wood framed no crawl space floors, and six and seven, no insulation. The rest are fairly consistent.

Next slide.

And retail occupancy, again, because of the internal gains, more climate zones are showing no insulation as cost effective, and it's actually producing energy savings if you look at the statewide energy impacts.

Next slide, please.

And this is other floors. Next slide. I think the co-efficients, and I think that's it. Next slide.

These are actually, I guess they're in the printed handout slides. You can see what we're proposing as the U-values for the 2008 standards all compiled for daytime.

Next slide.

Retail. Next slide, and 24 hour. And next slide.

You can find more information, you can download the report at the following Website. If you actually download the report, you can see that we actually have statewide impacts, energy impacts broken down by climate zone. In the appendices you can see all the coefficients we used, and there's just a lot more wealth of information. And you can look at the results if you download it from our Website, of actual rankings, and the TDV curves we used are at the AEC Website.

Next slide.

That's it. Any questions or comments?

MR. SHIRAKH: Any questions for Charlie? If you would come up to the podium, Charlie, you can probably sit there next to Jim. That young man first. Well, I don't know, you guys -- Andre first, and that gentleman second.

MR. DESJARLAIS: Andre Desjarlais, Oakridge National Lab.

I'd like to suggest, I think insulation additions are great, and the proposals here, I'm certainly in favor of. One of the things I would suggest that the Commission consider, though, is that if you're increasing the mandatory requirements for insulation, then some of the other assumptions that you've made in the past really need to be looked at again, specifically,

the question of whether or not cool roofs are cost effective in all of the climate zones.

There were several climate zones in the initial analysis where they were very marginal. And I think it would behoove the Commission to re-examine, at least do some point checks, to make sure that now that you've changed the basis assumptions on the energy performance of the building, and you, and you incorporate higher levels of insulation, that some of the initial cost estimates that were made requiring cool, or allowing cool roofs into the code may no longer be applicable. And I'd like to just suggest that those be re-visited.

MR. SHOEMAKER: I'm Lee Shoemaker with the Metal Building Manufacturers Association. And I appreciate the changes that Charlie made in the analysis based on the info we gave him after the last presentation on some of the metal building roof cost data, and we think that the numbers now look, look more reasonable and reflect the, the proper cost data.

We still have some concern about the metal building walls and the assumptions used there, in terms of the cost data. And it seems that the assemblies that were used from the joint appendices were the ones that have two layers of

fiberglass insulation.

And, and Jon mentioned there also may be some that use sheeting. And so we're, we want to visit that and see if it looks like the cost data for the, for the walls is accurate based on those types of assemblies, because as we did with the roof, it's not just a matter of adding the cost of that second layer of insulation to the assembly. And, and a metal building wall, to put a second layer of fiberglass insulation you have to come up with some way to support that insulation that's spanning between the seven foot spaced girders inside the building.

So it's, it's more involved to do that type of assembly, and we want to make sure that the analysis is accurate with regard to the costs associated with that. So we'll be looking at that, and seeing if there's anything we can pass along for, for them to consider in, in looking at that.

The other -- I agree with Andre's comments on the cool roof sensitivity. I thought that was an interesting part of this latest draft of the report, was the, the cool roof sensitivity study. For example, in Figure 7 on the report, it's the daytime roof insulation for metal buildings and the cool roof sensitivity analysis,

and looking at that plot for Climate Zones 1, 2, 3, 11, 12 and 16, this is telling me that it doesn't matter whether I have a cool roof on that building or not it's going to have the same insulation requirement.

So that makes me wonder, the, the requirement to have a cool roof now on, on all low slope commercial buildings makes me wonder why is an analysis like this saying that that may not necessarily be the case.

So I think this was a, a good piece of information. I think I would suggest that it needs, needs to be looked at closer and, and see how this interacts with the other cool roof requirements. I know tomorrow we're going to hear some more presentations on the current thinking on cool roofs, and I think we need to look at that together with some of these other studies to see how this all fits together.

MR. PENNINGTON: Comment on that? It doesn't seem like -- sorry, thank you -- that insulation doesn't matter in those cases. It's whether or not the change in impact causes a change in what level of insulation is cost effective. And so you could have the same level of insulation to be cost effective under a fairly wide range of circumstances. And, you know, so I

guess I wouldn't agree with your initial conclusion that it seems to you that, that, you know, the conclusion on insulation is insensitive to the cool roof.

MR. SHOEMAKER: I'm just looking at it from the standpoint that the life cycle cost analysis showed that if I have a building with a cool roof and a building, the same building without a cool roof, it gives me the exact same amount of insulation that comes out of the life cycle cost analysis. So that's, that's where it, you know, it just seems a little, little disconnect with the --

MR. PENNINGTON: So in one case it could be hugely cost effective, and in the other case it could be just well cost effective with that, whether it has, has or does not have a cool roof.

MR. SHOEMAKER: There are different ways to look at that, yeah. And then, and just in general, I, the, the life cycle cost analysis, I appreciate the additional curves in here, the J curves, as you called them, to give some more insight into how that life cycle cost analysis was implemented, because I think I understand that a little better now. And I was confused last time because this is based on a 30-year life cycle cost analysis, and, and those J curves that give you

then what the lowest life cycle cost is. And I was confused.

I think I'm, my mentality is more of the ASHRAE, where you're, where you're looking for a payback scaler, eight-year payback, whatever it's assessed to be. This analysis really doesn't do any kind of a payback analysis. It may take five years, it may take 30 years for the cost of that to be seen by the building owner. Is that true?

MR. PENNINGTON: The, the statement that we don't consider payback is a correct statement. I don't, I don't think any of these life cycle costs conclusions translates into a 30-year payback, you know, but it, it can easily be more aggressive than an eight-year payback.

MR. SHOEMAKER: Uh-huh. It would be interesting to know what that was, I think, what the payback was, you know, for some of these.

And then, let's see. I guess the report mentions that the life cycle costs model is based on an initial cost of the base case. And I wasn't exactly sure what the base case was. And, you know, it might be good to add something to say what the base case was for each of these assemblies, because I, I was wondering if, if the through fastener was the base case for all of the metal building groups. I think, you know, when

you talked about that, and I didn't see whether that was, was what was in here or not, because you really didn't state that. So I wasn't certain about that.

MR. YU: Well, the base case is the cheapest construction assembly and everything in that joint appendices, if it's -- probably I think you're referring to the one that includes screw-down through fastening and standing seam, double -- all those were evaluated, but the base case would just be the cheapest assembly. So, let's say the base case cost a dollar, and the next would be $1.50. Basically, we only included the 50 cent cost in the life cycle cost analysis. That's the incremental cost.

MR. SHOEMAKER: All right. I guess I wasn't clear whether it was the lowest cost in that grouping of -- for instance, a standing seam roof or a through-fashion roof, or whether it took the lowest cost of all the metal building roofs as the base.

MR. YU: It's all the metal building roofs.

MR. SHOEMAKER: Okay. And then, finally, this last comment, see if I can express this where it's clear. I, I may not understand completely. But I guess what is starting to

bother me about the, you know, this insulation requirement is if I have a metal building and I'm, I'm now looking at putting more insulation in the walls, and I may have to use two layers of insulation if the cost analysis does prove out to show that, I may have to put some rigid insulation in the wall to get the required U-value. So I'm spending more money insulating the, the wall.

Now, at some point I might say, you know, this is costing me a lot to do this, I can use other types of walls on this metal building. I don't have to put a metal wall on this building, I can use a concrete block wall or a tilt-up concrete. There are a lot of different ways you can put a wall surface onto a metal building.

So if I take that leap and say okay, I'm not going to do a metal wall, I'm going to put a, a different type of wall in the metal building, I then don't get credit for that additional insulation, that energy savings in that wall, because then when I do a trade-off analysis, let's say, of that building with a concrete block wall, the, the standard building that I'm comparing my proposed building, is a building with a concrete block wall, not a, a metal building with a metal wall, if that makes any sense.

So it's, I've always questioned whether

we're really looking at energy savings when we, when we're comparing different wall types, roof types, in a, in a construction like that where you can trade out different types.

MR. YU: I think that may need to be addressed in the joint appendices. I think you're referring to the fact that, let's say if a metal building wall requires R-14 insulation, that there is actually two walls there, and so you have a lesser U-value and more energy savings. Is that --

MR. SHOEMAKER: Well, it wouldn't be two walls. It would be instead of a metal wall, we could use another, another wall. You could have a concrete masonry wall, a tilt-up concrete wall.

MR. YU: I think that needs to be addressed in the joint appendices. I'm not sure.

MR. SHOEMAKER: I can -- and, and I would like to have the opportunity to submit some, some further written comments after we've looked at this report a little closer. And, but, but what I've summarized here I think is our basic input at this time.

MR. SHIRAKH: Actually, it would be helpful if you can send us an e-mail or something summarizing your, your concerns. That will help bus a lot.

Any other comments? That gentleman, and then Jon McHugh.

MR. DREGGER: Thank you. I'm Phil Dregger, Pacific Building Consultants, here on behalf of Asphalt Roofing Manufacturers Association.

I wanted to put my support, our support behind the comments of Mr. Andre Desjarlais, that we believe that the cost effectiveness of the current prescriptive cool roof requirements needs to be looked at, revisited concurrently with the proposed increased insulation values. The cost effectiveness of, of an assembly over the 2005 levels, I believe will be significantly different looking at a cool roof than if that same cool roof was put over a, a building, a roof insulated with the proposed 2008 standards. So we want to lend our support to that concern he also raised.

In terms of revisiting the cost effectiveness, obviously part of that equation is comparing the very important comparison between the energy savings and the cost, the incremental cost of making a traditionally non-cool roof cool. Up to this point, the data available, and that apparently has been used in the 2002 PG&E study, I think it's Page 38, Table 1, has a list of, of costs for basic roof systems and a non-cool roof

systems and cool roof systems. And the information is getting rather old, 2002.

And, as I said, on behalf of ARMA, we'd like to offer some updated cost information to the Commission for the review. And in fact, I have some copies -- they're handing those out. And let me just say this, this, I don't know, about seven or eight page document, we invited five well-known contractors across the state, and we, I outlined on Table 1 the basic roof systems for their non-cool roof configurations.

And then we looked at line item by line item, if you want to look at Table 2, just for an example. On the left side of the, the page are built-up roofs both over wood decks and steel decks, and three basic systems from an aggregate coated built-up to a cap sheet surface built-up, and a smooth surface. And then on the right side is those three basic systems being made cool by currently available methods.

And we, we got the cost information back from the contractors, and averaged it and put in ranges that are all here, I won't go over them. But it, it'd be, I think, important to note that the, the premiums associated with going from non-cool to cool in terms of our 2005-2006 snapshot are significantly different and significantly

higher than those in the previous study.

And so as we are encouraging to re-look at the cost effectiveness in general with increased roof insulation, at the same time we suggest that this review be done with an updated cost comparisons.

MR. SHIRAKH: Thank you. Any rebuttals or comments on this? Okay.

Jon McHugh.

MR. McHUGH: Hi. I'd like to -- could I get you to put the slides back to the J curve slide, because I thought I'd discuss a little bit about the issue of cost effectiveness.

What Charlie's done in looking at assemblies -- yeah, that's great. Thank you. When you look at assemblies that pick the minimum life cycle cost, it turns out that we actually exceed the cost effectiveness requirements of the standards because, let's say right now we, we have a situation where the standard is somewhere up here on the curve. Over the 30-year time period, we can pick anywhere along that line and it'll be cost effective. I could actually go to a lower -- let's, let's say the standard was here. I can go and, and pick a lower U-value than the minimum and still be cost effective in terms of the discounted 30-year period.

So by, by doing what, what Charlie's doing in picking the minimum life cycle cost, he ends up with something that is more cost effective than, than just saying I, I pay back in the 30-year time period. So that's that issue.

As it relates to cool roofs, you can end up saving energy, you, you can end up with a situation where you save TDV energy and at the same time do not change the insulation values. So it's not necessarily clear from the analysis, but I wouldn't jump to the conclusion. You have to essentially look at the evaluation of a cool roof with the insulation levels that we're proposing with and without. And I, and I believe that we actually have a lot of that information. Is that right, Charlie?

MR. YU: Yeah. If you look on the report we, I think I put in the TDV coefficient, which is basically the TDV, or the coefficients for the no cool roofs is higher, then that would require more insulation. So I think you can find both the no cool roofs and cool roof coefficients in the report. And that will give you some idea of whether it saves energy or not.

I think the magnitude of the coefficients is how much energy you'll save, and then jumping into the next level of insulation is

like another story, as Bill was pointing out. One's just kind of, and one's very cost effective.

MR. McHUGH: Those are my comments. Thanks.

MR. SHIRAKH: Thank you.

John Hogan.

MR. HOGAN: Thanks, Mazi. I'm John Hogan, with the City of Seattle.

I'd also like to start with the J curve here, too. And particularly for those cases where you've ended up finding that there were no insulations that were cost effective, I think it would be interesting to see what the curves were for that, because here we show one that's got a definite hoop at the bottom of it, but you could have a J curve where if the first measure's the one that's most cost effective, lowest life cycle cost, and has no requirement, the other one could be pretty much horizontal and, you know, use half the energy consumption. And I would argue if you're in something where you're looking at a difference that's .01 or .02, that's in the error band for the cost data you have.

And so I would, in particular in those cases, err to look on the side of what the top couple of measures were and see whether they're close at all before I would roll the standards

back.

MR. YU: Well, for one thing, I understand your point. I think with these curves the problem with your approach is we would have to run a separate simulation for each one with each insulation level. I think with this one, we used a, you know, like a coefficient, a regression method, so basically we would get a linear fit. And it wouldn't quite, it wouldn't quite look like what you're describing.

MR. HOGAN: Okay.

MR. YU: Does that make sense?

MR. HOGAN: Maybe. I know Charles Eley had done a lot of work with the ASHRAE 90.2 Committee when we worked on development of updates to the standard in the last 10 to 20 years. When we looked at fenestration we had questions about different results coming out, and Charles was actually able to print the top five performing values, and you could take a look at those.

MR. YU: Uh-huh. Yes, we will do that.

MR. HOGAN: You can do that with this --

MR. YU: No. We can definitely do that. I'm just saying that the top five values are from the regression method, and so if the coefficient is negative, it might not come out like the way you're describing. I'm, I'm saying basically with

the regression method and with an actual simulation, you might get two different results. And that's why we tried the Energy Plus to see if that was the case or not.

MR. McHUGH: John, you, you're talking -- this is John McHugh. John, you're talking about not just mass floors but mass walls, in some cases. So Charlie, what, what he's talking about is that in the cases where your coefficient is positive, so you might have something that's positive but it's got a small number associated with it, is that, is that what you're getting at, John?

MR. HOGAN: Right.

MR. McHUGH: So that there's still an energy savings, and, and the issue is, is if, if we go essentially backwards in terms of the stringency of the, of the standards, that might be, might be a mistake. In those cases where the coefficients provide a, a negative coefficient, then actually what we're doing is proposing something that saves energy. And, of course, you know, in mild climate zones and with the thermal mass, you may have some situations where removing insulation actually saves TDV energy.

MR. HOGAN: I understand the concept.

MR. McHUGH: Yeah. Yeah, I know. I

just -- so, so that, that's the issue that you're, that you're concerned about, is, is that we do a sensitivity around the, around those, around those assemblies where the coefficient is still positive. Is that right, John?

MR. HOGAN: It's that very first step from no insulation to some insulation, where you could be having significant impacts on the energy consumption of the building, and if the LCC is, you know, very close to each other, why do you want to pick up the one that has the most energy consumption. Isn't that within the air band, and so you'd, rather than rolling back the standard, you would maintain some existing level of insulation, or --

MR. McHUGH: So, so I think we can look at that. Yeah.

MR. HOGAN: Okay. I had a question about how the roof insulation calculations were done. Was this roof with, and I'm sorry, I haven't looked at the report, but is this roof with insulation above, or this -- it looked like the description said the insulation was below the roof, a wood frame roof.

MR. YU: The, the model we used, the simulation model actually was an attic roof to get the coefficient, but we ran the -- the U Values we

used in the coefficient was actually a 24 inch on center rafter roof with insulation underneath.

MR. HOGAN: So you modeled one thing, but the U factors are based on something else. Is that what you're saying?

MR. YU: Yes.

MR. HOGAN: Okay. There's been an issue in our area, and I don't know how much of an issue it is here, in terms of the one inch vented air space that's required by Section 1203.2 of the International Building Code. So it's, I don't know whether that was factored into your calculations or how that works. I, I think it's one thing to model an attic space and then presume you have this all open space above that. If people are trying to achieve that with a single rafter roof, that could be a little trickier.

MR. McHUGH: So, so just -- you're talking about the -- you, you've got a requirement for that there be an air gap between the roof deck and the insulation. Is, is that what you're saying?

MR. HOGAN: Right. When the insulation's on the inside. And for those in California who might be using the IBC at some point in the future, yeah, that'll, Section 1203.2 requires that one inch vented air space.

MR. PENNINGTON: Unless the building official decides that that's not necessary. Right? So we're going to call the Seattle building official for an interpretation on this.

MR. HOGAN: If someone would like to make that determination, it would be better to sort of address that in the IBC or California amendments to that so there's no confusion when building officials have to deal with that situation.

MR. McHUGH: I was wondering if we could maybe invite Andre Desjarlais up to talk about how frequently we, we see that kind of venting of, of especially flat roofs that have insulation matted on the underside of the roof deck. He might have some --

MR. SHIRAKH: Andre, do you want to comment on that?

MR. DESJARLAIS: Can I comment from here?

MR. SHIRAKH: No.

MR. DESJARLAIS: No?

MR. SHIRAKH: Sorry.

MR. PENNINGTON: I bet he doesn't want to comment.

MR. DESJARLAIS: Except for the West Coast you never see that construction anywhere.

That's a West Coast phenomena, and I think that comes from the use of wood decks.

MR. PENNINGTON: So what, what is the --

MR. McHUGH: What part of California is the world in?

MR. DESJARLAIS: Including your neck of the woods. Seattle -- I'm sorry. Washington, Oregon, and California are really the only three states that allow that construction to -- or you see that. This is having a ventilation space between the insulation and the roof deck.

MR. PENNINGTON: So you're saying that the, the rafter, the rafter space situations are not vented in other parts of the country. Is that what you're saying?

MR. DESJARLAIS: They, they don't require, they don't have vented air spaces. Those air spaces are, are simply not there. You typically would fill the cavities with insulation. To require a ventilated space is a West Coast phenomena. It's only required on the West Coast.

MR. PENNINGTON: I think it is a, it is a IBC requirement, right, so --

MR. DESJARLAIS: The purpose of ventilation, remember, is to control moisture. And, and it's not an energy related. People have traditionally tried to drag it in as being a, an

energy related issue, but typically the purpose of ventilation in attics and in, and in, in cathedral-like ceilings were originally all installed in the codes to, to prevent moisture accumulation in the structures, and not an energy savings -- not to be an energy savings feature.

MR. PENNINGTON: So is it partly in humid climates you don't want to be ventilating your attic because you're actually doing the opposite of --

MR. DESJARLAIS: You're bringing moisture in. That's right. And so typically, you'll never see ventilation in any, any of the -- in the southeast. Even, even as far north as Pennsylvania, it's typically not required. In fact, it's not allowed in some cases.

MR. McHUGH: Why, why I asked Andre up here was because, you know, Section 118 has a requirement about insulation position, where the insulation is supposed to be in contact with the roof deck, currently in, in Section 118. So if, if this is a --

MR. PENNINGTON: The IBC requirement, I think, we're getting really technically bogged down here, I think, but -- and maybe this is a good issue to take offline. But I think the IBC requirement is talking about attic spaces. Is

that right? So it sort of depends on whether or not this rafter roof is an attic or not. We've been pretty careful in the past not to call it an attic.

MR. McHUGH: We're, we're talking about a non-residential building. In general, these are plenum spaces as opposed to attics, so.

MR. HOGAN: When you're a building official there is no general case. There's a specific building that wants a permit. And I don't have any position on whether vented air spaces are good or not good. I'm raising this as an implementation issue. And it's, I would love to see all the moisture stuff taken out of the energy code, I don't know why energy gets saddled with this. This is a building construction issue, it should be in the building code. It shouldn't be a, an energy issue. It shouldn't be an energy code issue.

So moving on to some other implementation issues. The tables were presented all as U-Factors, and that's an easy way to present it. I, I don't know if that's the format for the report. I would hope that the Commission, when they adopt any revisions to the standards, that they also include R-Value compliance options. I think it's much more complicated to force

everybody to do E-Factor calculations or to force them to go to a reference manual to look things up.

I understand the shift here, that the current version, the 2005, says here's one R-Value for all the roofs. Here's one R-Value for all the walls. And so you've got different assemblies and have different U-Factors, but you do something like standard 90.1, where it says for this type of wall, mass wall, here's the U-Factor, here's the R-Value. Metal stud walls, U-Factor, R-Value. Wood stud walls, U-Factor, R-Value.

MR. YU: I think the problem there may be with the ACM manual it's hard-locked into one U-Value as the standard. When you run the compliance versus the base, the ACM only specifies one as, you know, one U-Value as the basis.

MR. PENNINGTON: Well, you have a look up situation regardless, right? If, if you're trying to describe umpteen different wall configurations and what the R-Value is for that particular situation, you're looking something up; right?

MR. HOGAN: I'm, I'm looking at a table that's in the standard, 143A, as prescriptive criteria. So this -- I realize that there's a big industry here for doing annual energy analysis,

and people do a lot of computer modeling. But in our area we've seen a lot of people do a prescriptive approach because they don't want to spend the money on the modeling, and I'm sure there are people who have small building projects who say just tell me what I need to write on the drawing so I can get a building permit.

And Table 143A has an R-Value, and so it looks to me like if you say I'm going to put R-19 in the roof, or R-13 in the walls, you're done. You walk away.

MR. PENNINGTON: Right. And that's really problematic to have that like that, because, because you end up with, you know, no consideration for the thermal conductivity through the opaque portions of the assembly. So it's really a problem to have it presented that way.

MR. HOGAN: Well, my recommendation, though, is, in this new variant, that you do something more like ASHRAE 90.1 so you don't have one R-Value. In here it looks like there are six wall U-Factors. For each U-Factor you have an R-Value. So --

MR. PENNINGTON: So, so in Joint Appendix 4 we have, what, 25 assemblies, and everyone wants to add assemblies to that 25. And to be correct about the R-Value you need to be

saying what the R-Value is for those 25 assemblies, rather than these few that are in the list there. And so you're going in a look up situation. That's my comment.

MR. HOGAN: Put as many assemblies as you want. The Washington State Code I think has 3,000 different assemblies, two by four walls, two by six, two by eight.

MR. PENNINGTON: And that's, there's no looking up for those 3,000 or assemblies.

MR. HOGAN: No. But the one that goes in the prescriptive path is the life cycle cost optimum. So, you know, if, if you want to get to a .056 wall with two by fours and R-7.8 sheathing, or something, sure, you can look up all those things, but if you just need to put in R-19 and that gets you there, and that was what the optimum was from the analysis, you just put that there. If you think that's the best option, why don't you educate consumers and say here, just put R-19 in this wood stud wall and you're done.

Again, they can go to this appendix and look up equivalent options. That's fine. Any of those would comply. But just have a simple straightforward thing. I would encourage you not to delete all the R-Values from Table 143A, if, if that's where the proposal's going. I understand

how the report was presented, I didn't know whether that was a recommendation from the report that R-Values be struck from that prescriptive table.

MR. YU: Well, yes, we can include the R-Values. There would still be the same U-Values, it would just have an associated R-Value with it.

MR. HOGAN: I mean, the advantage, the advantage to that is that people don't know the framing factor for a wood stud construction, they don't know the short circuiting, the thermal bridging for metal studs. If you say, you know, the, whatever the U-Factor is for the metal studs, here's the R-Value that would go in the cavity that would comply with that. Again, they're done. Okay. Not to belabor that any further.

I guess the one last point, proposing retail as a separate category. I think there's some implementation concerns about doing this, also. I understand the notion that when you do modeling you get different results if you have different internal loads. And maybe if you have strict retail situations it's pretty straightforward to figure out well, we think this is all going to be retail spaces in here so we'll let them do these sort of requirements because we think that's what it'll be.

For people working in urban environments, our city, I presume, Sacramento here, you have mixed use buildings. You have the first one or two floors are generically called retail, but they can be travel agencies, they can be all sorts of things that really don't have very high internal loads, as well as any other uses. And they change frequently over time. And so having a separate category that's retail, it seems problematic to implement that over time.

It's, it's much clearer if you've got residential, which is Group R, versus, you know, commercial uses, because they don't switch back and forth too much between those two. But retail and office, those sort of uses shift back and forth quite a bit.

Thank you.

MR. WARE: Dave Ware, with Owens Corning.

I, I think what I was waiting to do was, actually it turned out, was to echo many of the things that John Hogan has just mentioned. It seems to me that the overall implication of the analysis, and I have not read the entire report to completely understand it, is that in -- the, the results of the life cycle analysis is indicating that with all the new assumptions and, and things

like that, that many of the current efficiency levels for walls and ceilings, in particular, floors might be a little bit differently, there would be a roll-back in the current stringency of the standards. Is that correct?

MR. YU: I think for, only for certain climate zones. I think for --

MR. WARE: Fair enough.

MR. YU: -- you know. More so than not, insulation levels are going to be more stringent, and it's just for certain climate zones.

MR. WARE: Certain climate zones.

MR. YU: They're going to be less stringent. And another reason why you might find that is because the climate zones are for, I mean, the results are for all 16 climate zones, whereas before they were clumped together, so they might have just gone with the more stringent insulation level. Basically, you know, 1 and 16, 1 requires less insulation, but they clumped them together and said hey, let's go with 16, so you see more insulation levels. So it's broken out by climate zone now.

MR. WARE: Okay. Fair enough. But having heard that, some of the results are depicted from the results of these J Curves that John mentioned, and they are at the lowest point.

And during the 1992 process, for both commercial buildings, the nonresidential buildings and the residential building process, there was an effort to not only look at lowest life cycle cost but look at current construction practice. So John made the point much more eloquently than I can, but in the context of trying to find that lowest value, I think it's important to ensure that there's not a disruption in the marketplace simply because the results of an analysis based upon certain assumptions is at that lowest point.

I mean, if you -- and, and if we're going to roll back, notwithstanding -- in the whole of things, it may look like there's, there's some statewide savings here, if we're actually disrupting the marketplace and current construction practice to pick something that's, you know, not a lot of difference, I, I would argue that we ought to err on the more conservative side and, and go with construction practice, if I'm saying that correctly.

And the, and the other thing I think I wanted to mention was John mentioned the point, again, he mentioned, in the context of roofs, did you account for the fact that there's one interior space. Regardless of what the code says, I deal with this all the time, it's not one of my most

pleasant things I have to help out designers and, and customers around, but I'm also been on many jobsites all through the country. There's a lot of confusion over that. Yes, it seems like it ought to apply to attics. It's part of the IBC standards, it's part of the IRC standards, it's part of the UBC standards, and the current California standards reference that right now in the roofing requirement, there has to be this one interior space.

Is it universally enforced? Of course not. Okay. And are there roof situations that simply do not accommodate cross-ventilation? Of course there are. But the point I think John was making that I support is that I think that you need to at least assume that in a piece of your analysis, and do some sensitivities around that and see if this makes any difference or not.

MR. YU: This is for attic roofs, right?

MR. WARE: This is for your roof analysis. You know, I wouldn't call it an attic roof.

MR. YU: In particular rafter roofs, is what they're talking about.

MR. WARE: Yeah. It's a --

MR. YU: Okay.

MR. McHUGH: I'd just like a

clarification. Is, is this for high slope roofs, or would this also apply to low slope roofs?

MR. WARE: Both. Thanks.

MR. GOVEIA: Hi. My name is John Goveia, from Pacific Building Consultants. And I am also here on behalf of ARMA.

I really wanted to just try to clarify the comments about confined spaces. You know, you're trying to avoid the use of attic, and I believe what everybody's talking about are confined spaces between rafters, whether it's a vaulted ceiling or whether it's a low slope roof that has the same kind of cavity space that has no air flow through it that runs the risk of condensation.

One question, though, I had on your life cycle. On your Slide 5, I know you referred to initial cost as the basis, and I'll just throw some numbers out. If it costs 20 cents to do something that -- and the up charge or the premium cost is now 50 cents, you're using that 30 cent difference as the basis to do your life cycle. Right?

MR. YU: Yeah.

MR. GOVEIA: What happens in the situation, though, where that thing that you did for that 30 cents doesn't last the 30-year cycle?

If it's only a 15-year component, such as, you know, roofing, where it's very related, where the roofing isn't going to go the 30 years and you have to incur that cost another time in that 30 year cycle.

MR. YU: Well, we assumed a 30 year life cycle for all envelope. If there's a particular instance where it won't last 30 years I think it needs to be addressed separately, or maybe you can e-mail me. What, what sort of, can you give me like a specific problem you're referring to?

MR. GOVEIA: Well, in particular, when we talk about systems, roofing systems, rarely do the roofs go to the 30-year life. As a matter of fact, you may have sometimes three replacements in 30 years. I'm sorry, the initial plus two replacements. And that's a whole different level of life cycle analysis, because it's not strictly based on the initial cost difference of the first system only, because that system won't last the 30 years.

I, I mean, I'll be happy to, I'll give you my card, and we can go over some life cycle analysis.

MR. PENNINGTON: Cy, I would be looking for a case like Charlie's talking about, about where, where is it that there is a component

that's part of the incremental cost that doesn't last the 30 years. I can't think of it.

MR. WARE: Roof coatings can't. As a matter of fact --

MR. PENNINGTON: That's not part of the incremental cost.

MR. YU: So if, if we consider --

MR. PENNINGTON: That, that assembly stays the same, right? So we --

MR. GOVEIA: No. That's an incremental cost if you're going from non-cool to cool, for example.

MR. PENNINGTON: So we're not evaluating non-cool to cool.

MR. GOVEIA: Okay. Okay. But what happens in the insulation replacement when you do, let's say, a re-roof of a 15-year roof, and we have this insulation value that's part of the component system that gets replaced as part of the re-roof. So if we are talking about insulation, that insulation gets replaced 15 years when you do the re-roof.

MR. YU: I guess I'm not quite understanding your question. For the cool roof example, let me just, maybe I can explain it to you if you're thinking along those terms.

But say every building needs a new

coating every 15 years. That cost would be across the board for all the buildings and therefore it would cancel out, so it wouldn't be considered.

MR. GOVEIA: But it doesn't on different kinds of systems. I, I would just urge you to look --

MR. YU: I guess I understand that.

MR. GOVEIA: -- look at the cost data that we provided, you'll see the --

MR. YU: Okay.

MR. GOVEIA: Different kind of systems have different costs associated, and some don't require coatings. And so that roof, that could go, let's say, 20 years without a coating, and, and minimal, normal maintenance. Other systems are higher maintenance items. That's all I'm trying to bring up, is they're not all in this equal plain of, you know, 15 years they all get replaced, or 20 years they all get replaced. Okay?

MR. YU: I understand.

MR. GOVEIA: All right. Thank you.

MR. SHIRAKH: Any other questions or comments on the insulation report? Dave. It's your last chance, Dave.

MR. WARE: Thanks, Mazi. Dave Ware, with Owens Corning.

I, I forgot to make one more comment. In the -- the proposal is to move from a, what has -- the current prescriptive approach and depicting R-values to one of U-Values, U-Factors. And I also agree with John Hogan here. I deal, again, with designers all the time, and enforcement officials all the time. Unless you can tag these assemblies, albeit maybe the minimum assembly that you're using, to come up with the U-Values, with an R-Value, you will not be paying attention to designers' needs and enforcement officials' needs whatsoever.

We live in the world of energy analysis, but this, this is only a handful of people compared to the rest of the world that actually construct, design, construct and install materials, and, and it's very important that you tag these two real things, otherwise that will get lost out in the field.

MR. YU: I don't think that would be a problem. I mean, each U-Value is corresponded to an R-Value, so, I mean, that's just a matter of adding it in. That would be real easy.

MR. PENNINGTON: I would disagree about how easy it is.

MR. YU: Never mind. It wouldn't be really easy.

MR. SHIRAKH: Okay, we agree to disagree. Any other comments related to this report?

Seeing none, we're going to move to the last segment of this workshop, which is the public comments. And, you know, may I see with a show of hands how many people plan to speak?

John Hogan, you're on.

MR. HOGAN: I wanted to talk about two items, both of them are related to lighting.

First of all, the, I wanted to talk about the lighting control credits. I know that there was some discussion this morning relative to retail, and I'm not speaking about retail in specific. But as I have in the past, I would encourage the Commission to remove the lighting control credits from the California, from Title 24.

I think we want to see efficient lamps, efficient ballasts, efficient fixtures, and not have what are in all effect loopholes that allow people to put in inefficient systems, as long as they're putting in controls.

In particular, and if the Commission did not want to go that far, I think you could take some steps towards that by taking a look at occupancy sensors. So I would recommend that the

credit for occupancy sensors in Section 146-A(4)(d) and Table 146-A be deleted, so there would be no credit for occupancy sensors there. And this is the first two rows in the table, and it's the first entry in the fifth row under Combined Controls.

That would be a first step. It would be better to go a little farther and actually require occupancy sensors in lieu of giving them a credit. I can read you some language from the Washington State Energy Code, Section 1513.6.

"All office areas less than 300 feet enclosed by walls or ceiling height partitions, all meeting and conference rooms and all school classrooms are required to have occupancy sensors."

So I would encourage the Commission to require occupancy sensors for those spaces.

The criteria for the occupancy sensors could be similar to the language that's in there for the control credit, but in 146-A(4)(D).

I think maybe one additional item to require that the light fixtures controlled by occupancy sensors have a wall-mounted manual switch capable of turning off the lights when the

space is occupied. I think the challenge is you have situations where people walk into a perimeter office just to put some mail in an in box, flips on the occupancy sensor, it's on for 30 minutes. Or you have somebody working in that space, there's plenty of daylight, you don't want the lights to be on just because they happen to be in the space.

I looked through the language in Title 24 that talked about the controls being able to activate some alternate set of lights, or de-activate all of the lights. It seems like there was a choice there, and I think you should always have the ability to turn off the lights manually. That was the comment I had on that.

And then --

MR. PENNINGTON: Is there language in the Seattle code that has, that, that guards against that?

MR. HOGAN: Well, this is, this is the, yeah, the Seattle code and the Washington State Code is that language I read, that if it's controlled by occupancy sensors it shall have a wall-mounted manual switch capable of turning off lights when the space is occupied.

So, so what this means essentially is you can't just have a sensor up in the ceiling

that you don't have any control over. You have to have a manual wall switch that you can flip to turn it off.

The second item I wanted to talk about was the lighting power allowance for parking garages. The value in Title 24, in the table, is 0.4 Watts per square foot. That's the highest value I know of any code in the United States. It seems, I don't think that value's been seen in IES Standard 90.1 at least since 1989, and maybe not even at that point in time. This is a place where people are typically putting in lower lighting levels. It seems it's a good opportunity for improvement.

In the mid-1980s the city of Seattle had a requirement in their Energy Code if you had a project over 50,000 square feet you need to show some ten percent additional savings. And this was envelope mechanical lighting. You can choose where you wanted to do it.

We saw very frequently people taking credit, making improvements in parking garage lighting. And the values, we saw were between .14 and .20 Watts per square foot. So this is approximately a third to a half of what's in the California code now. And that was 20 years ago. And I know there's a lot of surface parking in

rural areas and suburban areas. Parking garages are very important in urban areas. If you look at the zoning codes you'll see substantial parking requirements in urban areas as part of the zoning code.

A typical parking space is about 350 to 400 square feet when you include circulation area. Our Seattle zoning code requires for retail spaces one parking space for every 350 square feet. So this means for every square foot of retail space there's a square foot of parking. So however large a retail space is, that's how large your parking garage is to go along with that.

For office space, it's one parking, one parking space for every thousand square feet of administrative uses, but it's one per 350 for customer service areas, one per 350 for medical offices. You start weighting those, then for every thousand feet of office space you have 500 square feet of parking. So it's a significant amount of area. People maybe don't always think about this, but there's a lot of parking that's going up in urban areas.

Then when you look at the hours of operation, so .4 Watts a square foot is usually on 24 hours a day, seven days a week, so 8760 hours per year. If I looked at an office space we could

assume 3,000 hours of operation a year, so assume 12 hour days, five days a week. So 60 hours a week times 50 weeks, 3,000 hours. So that's approximately one-third the number of hours. So if you ratio these values, each square foot of parking continuously operating at .4 Watts a square foot consumes the same amount of lighting energy on an annual basis as a square foot of office operating at 1.15 Watts a square foot.

So it seems there's a lot of opportunities here. There's been a lot of focus on the interior of buildings. It seems like the parking garage, something has maybe been overlooked.

MR. SHIRAKH: Jim, is that something we can look at?

MR. BENYA: Jim Benya, Benya Lighting Design.

Good suggestion on the motion sensors. We'll have to take a, a look at that. Ordinarily, an application what John's describing typically happens anyway. But that's a, you know, to make it mandatory in certain space types has a certain amount of, of value, and I think we've got to take a look at that.

With regard to the parking garages, yeah, I think the power density value that John

cited is actually a little on the high side, and we could put that on the list of things to study. The biggest problem I've seen is that in the modeling of these facilities, many times the people developing the models and the power density standards fail to take into account the ramp areas correctly. And what happens is the ramp areas and entrance areas have got to be over-lighted to compensate for the tunnel effect of leaving the roadway and entering into a darkened garage by day. It's actually a really serious problem.

Another misconception is that you can turn lights in the interior of a parking garage that has small windows off during the day. Due to contrast, you actually can't. Even if it happens to be the area right next to the effective window aperture, because of contrast, you end up with extremes of, of disability due to glare created by the windows.

So there's some misconceptions about parking garage, but John's got a good point. I, I think we're seeing designs in, in the area of .2 to .3 are, sort of seems to be the working area in what I'm seeing these days, and so a .4 value should be questioned. It's very valid.

MR. SHIRAKH: I think John, John had a good point that this, this is a 24 hour facility,

and it does have a peak impact problem. So it would be good to look closer.

MR. BENYA: Yeah. It's, the, the peak impact has, you know, something we want to study, and like I say, the, the sad thing about it is that these, one would like to think a parking garage is daylighted because it has windows, and in fact, they aren't. Almost never can you get the right -- enough quality of daylight enough to actually create a problem that needs to be solved by electric lighting. So, but we'll, we'll definitely take a look at that and make it -- particularly get the power density value down is, seems to me quite doable. Thanks, John.

MR. SHIRAKH: On the control credit question, the, the motion sensors or occupant sensors are getting credit under the 2005 standards as a particular type of occupant sensors that are calculated by level switching and they may have integrated daylighting controls in them. You're not suggesting that we make that the mandatory requirement.

MR. HOGAN: John Hogan. Is this a leading question? So the Seattle Energy Code does require that you have automatic control for all lighting within daylighting zones. So I think certainly the Commission could consider something

like that.

We do have an exception to that requirement for small offices, where we allow people to either have photo cell control for a small office, perimeter office, or have the occupancy sensor. So the, if the control you're talking about has both those features, that's more than we require in our code in Seattle.

MR. SHIRAKH: And as far as the other controls, are you suggesting we get rid of --

MR. PENNINGTON: Let me, let me understand that dialogue you just, you guys just had. We, we changed the standards for occupancy sensors to dis-allow the credit for just your -- just plain old vanilla occupancy.

MR. SHIRAKH: Correct.

MR. PENNINGTON: And the only credit that's available is for a very sophisticated multi-faceted controller.

MR. SHIRAKH: Right.

MR. PENNINGTON: And I don't think John knew that when he made that --

MR. SHIRAKH: I think he knows, he knows our code better than I do.

(Laughter.)

MR. PENNINGTON: What -- I'm not sure that that's the case.

MR. HOGAN: I didn't, I didn't read it that it had to have both those features. No.

MR. SHIRAKH: Okay. So basically what you're suggesting is we adopt your Seattle code related to occupant sensors. That has the bi-level or multi-level --

MR. PENNINGTON: Let me see if I understand. It seems to me the proposal is that the simple vanilla controller ought to be mandatory, and perhaps you might want to continue to have a credit for a, a multi-purpose controller.

MR. SHIRAKH: Is that what you're suggesting?

MR. HOGAN: Certainly the, there should be a requirement for occupancy sensors. Again, we don't support any additional credits, but you could do something where you could separate that out and say well, if you have an occupancy sensor with photo cell control, we would give additional credit as Title 24 has in the past.

MR. FLAMM: This is Gary Flamm. While John Hogan's here, it appears I've read that the State of Washington has some pretty good language about alterations, at what point re-wiring and meeting the mandatory measures is required. And I, I think what we have written is, is -- needs

some, some tweaking, needs some clarification. At what point do we require re-wiring and at what point do we require only meeting the lighting power densities.

And I remember reading something that the Washington State Code had that seemed to be pretty well written. Could you elaborate on that, John?

MR. HOGAN: Sure. It's not as short as you might hope it would be. But there's a requirement, two separate sets of requirements. One deals with the lighting power allowance, so it's basically when our code, I think it's something similar to Title 24 that says if you change 60 percent or more of the fixtures in a space, then you need to show compliance. If it's less than 60 percent, then you need to maintain or reduce the wattage.

The Washington State Code and the Seattle Code do that on a room by room basis, so it's not on an entire tenant basis. So you, you can't be a person that has three floors in a 20 story high-rise and remodel, say, just one floor and say well, I'm not subject to the requirements because I didn't do the whole tenant space, or something like that. So we do that room by room.

MR. PENNINGTON: So we do it by permit.

So if, if the permit only covers the renovation, then that's what the 50 percent applies to.

MR. HOGAN: Yeah, there are ways of working around that. We, we used to have it more generated by permit. The problem is that you can say well, so I'm on this floor, I'm doing one room over in the northwest corner and, oh, yeah, I'm going to put in a light switch over here somewhere, so really I'm working everywhere on the floor, so I'll just count it as the whole floor, when they really weren't doing a lot with the light fixtures or it really wasn't the amount of light fixtures. And so it's, we got away from what was covered in the permit.

MR. PENNINGTON: So I think we tried to deal with that too, Gary, but it's pretty slick what we do, but no one knows how slick it is.

(Laughter.)

MR. HOGAN: Yeah, that's always a challenge, getting that onto the ground to the building officials. Right.

In terms of the controls portions, we say if new wiring is being installed to serve added fixtures, or fixtures are being relocated to a new circuit, then controls have to comply with the lighting requirements. And let me read a couple more things and then I'll go back and give

some specific examples.

We also say in addition, office areas less than 300 square feet enclosed by walls or ceiling-high partitions shall be equipped with occupancy sensors. And where there's a new lighting panel or a moving lighting panel, all new raceway and conductor wiring, then you also need to have controls comply with our photo cell switching in addition to the other switching.

And if you put in new walls or ceiling height partitions in an existing space and create a new enclosed space, even if you're not changing the lighting fixtures other than relocating them, you still have to comply with the controls requirements for that space. So you'd still need to do the occupancy sensor. Again, you don't have to do the photo cell controls for that portion. So essentially, we're saying with the wiring it's pretty much whatever you touch, you need to make that comply with the code.

You can have a situation where you've got a lot of fixtures in the ceiling and you're just moving them around because you're moving partitions, and so if you're not changing all the wiring it doesn't trigger the requirements. But even if you're not changing the wiring, if you create new enclosed office spaces, private

offices, yeah, then those do need to comply with occupancy sensors.

MR. SHIRAKH: We don't say a whole lot about alterations in the standards, but we do say a lot about them in the non-residential compliance manual. And we actually have language that's very similar to some of the things you're suggesting.

MR. FLAMM: This is Gary Flamm. Didn't I read somewhere, I thought it was Washington State, that if you have a T-Bar ceiling, something that's accessible, and you're, you're doing the lighting, you, you're just changing luminaires, that you then have to do the wiring also, the controls, because by nature of the fact that it's accessible. So if the wiring is readily accessible by means of being behind the T-Bar ceiling, then you go, have to go ahead and do the control side.

MR. HOGAN: We have a requirement that prohibits installing insulation on a suspended ceiling, and so you can't get in and monkey around with that. You have to put it someplace else. But if you're not touching the wiring, we don't require that you install controls.

MR. FLAMM: I have to call on somebody else, then. I don't remember who it was, but I had read that in somebody's code.

MR. SHIRAKH: Okay. Somebody else had a -- sorry.

MR. KNUFFKE: Thank you. Charles Knuffke, with the WattStopper. I was just going to reiterate, the idea of having a switch on the wall that can over -- or that can be used in every space, that seems to be something that actually lines up very similar to what is required under the IECC Code requirements that even though if you've got an occupancy sensor you do need to have a switch on the wall. ASHRAE allows the switching device to be a switch on the wall or an occupancy sensor. California code kind of requires that, as well. I would really second John's point that making a switch on the wall so that people can turn off the lights to be able -- when they're in the space, makes a lot of sense.

I would, however, say that the controls credit in Section 146-A, in that table, is specifically for occupancy sensors that are set up to be either manual on or set up so that when you walk into the space you only go to a low level lighting, and then the occupant has to initiate some sort of an action at a switch in order to get high level. And I've got to say that with a number of presentations I've done to the electrical engineering community, they are

definitely looking for those types of credits to still be there for them to be able to meet the code requirements set up and put upon them. So, thank you.

MR. SHIRAKH: We do use the control credits to try to bring in new products to the market. So getting rid of it doesn't give me a warm and fuzzy feeling at this point. But we can definitely tweak and -- well, we, I think there is a consensus that we need to look at the, the plain vanilla occupant, since there is a monetary measure, and I think there is an agreement here. We'll look at that.

MR. KNUFFKE: While I'm here, I'd like to just make one other comment, which is Section 131-A that talks about the area control device. I would definitely be an advocate of trying to rewrite that yet one more time to try to make it a little more understandable. At this point it states that the area control device has to be capable of overriding any automatic control device in a space. If you've got a daylighting control controlling, let's say, the row by the windows, you may not want the, the switch on the wall to be able to override those lights on. I just think that that is really something that's much more similar to what, again, is required under, I

believe it's the ASHRAE code, that says that if you've got a time based system the switch in the space that controls the lights has to be capable of overriding the time based system.

So it would be a minor change to the code, but it just would be a recommendation.

MR. SHIRAKH: Maybe you can work with Gary on that clarification.

MR. KNUFFKE: Thank you very much.

MR. SHIRAKH: Any other questions or comments?

So with that, I'm going to bring this, today's workshop to a closure. We have a full day tomorrow, and the topics are going to be cool roof, cool ducts, and there's a bunch of water heating measure that will be presented tomorrow afternoon. So if you're interested in those topics, please show up tomorrow at 10:00. And if you haven't signed our sign-in sheets, please do so on the way out. And we'll see you tomorrow.

Thanks.

(Thereupon, the 2008 California Energy Commission Building Energy Efficiency Standards Workshop was concluded at 3:00 p.m.)

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CERTIFICATE OF REPORTER

I, CHRISTOPHER LOVERRO, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Energy Commission workshop; that it was thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said workshop, or in any way interested in the outcome of said workshop.

IN WITNESS WHEREOF, I have hereunto set my hand this 15th day of May, 2006.